[Part 9. Reprinted 1959]

IMPERIAL MYCOLOGICAL INSTITUTE

REVIEW

OF

APPLIED MYCOLOGY

VOL. XI SEPTEMBER 1932

TENG (S. C.). **Fungi from southwestern China.**—*Contrib. Biol. Lab. Sci. Soc. of China*, Bot. Ser., vii, 3–4, pp. 69–84, 1932.

Taxonomic notes are given on some fifty fungi (chiefly woody forms) collected in 1928 and 1930 in three provinces of southwestern China, viz., Kwangsi, Kweichow, and Szechuan.

TENG (S. C.). **Fungi of Nanking I.**—*Contrib. Biol. Lab. Sci. Soc. of China*, Bot. Ser., vii, 3–4, pp. 85–127, 2 pl. (1 col.), 1932.

Taxonomic notes are given on some 240 fungi (Phycomycetes, Ascomycetes, and Basidiomycetes) recently collected in the vicinity of Nanking, China, of which four are regarded as new species and furnished with Latin and English diagnoses.

BUTLER (E. J.) & BISBY (G. R.). **The fungi of India.**—*Imper. Council of Agric. Res., Scient. Monograph* 1, xviii + 237 pp., 1 map, 1931. [Received April, 1932.]

This list of 2,351 fungi recorded from India up to 1930 has been compiled in the hope of facilitating the work of those engaged in the study of Indian mycology.

An historical sketch is followed by an account of the distribution of the fungi, supplemented by tables showing the comparative numbers of species in India, the Dutch East Indies, and Manitoba [see next abstract], those common to India and Europe, and the known distribution of the Uredinales of three northern areas of India (Kashmir Valley, Simla, and Kumaon).

Perithecial stages of 15 species of Erysiphaceae have been found in India on some 59 different hosts in 77 collections, of which 43 originated in the Himalaya, especially Kashmir, and 14 in the Indo-Gangetic Plain. In the hotter parts of the country the conidial (*Oidium*) stage predominates. The sooty moulds in the wider sense comprise 64 species, most of which occur in the damp, hot climates of the Western Peninsula from Bassein to Travancore and of Eastern Bengal, Assam, and Lower Burma.

No new species are described, but five new combinations are made to transfer species recorded under *Vermicularia* to the genus *Colletotrichum* [cf. *R.A.M.*, viii, p. 268]. These are *C. capsici* (Syd.), *C. curcumae* (Syd.) [ibid., vii, p. 678), *C. jatrophae* (Speg.), *C. punctiforme* (Niessl), and *C. zingiberis* (Sundarar.) [loc. cit.]. It is pointed out that under the International Rules of Nomenclature,

Sclerospora javanica Palm should be known as *S. maydis* (Racib.) Palm. A new name, therefore, *S. indica*, is applied to the Indian maize parasite previously incorrectly identified with Raciborski's fungus.

A bibliography of 526 titles and a host index are appended.

BISBY (G. R.), BULLER (A. H. R.), & DEARNESS (J.). **Additions to the fungus flora of Manitoba.**—*ex Eleventh Ann. Rept. Canadian Plant Disease Survey 1931*, pp. 108–116, 1932. [Mimeographed.]

The 142 additions listed in this supplement to the authors' book 'The Fungi of Manitoba' (viii + 194 pp., 1 map, London, Longmans, Green & Co., 1929) bring the known species in the region under discussion (1st November, 1931) to a total of 2,109, besides about 20 on man and the higher animals.

SIDERIS (C. P.). **Taxonomic studies in the family Pythiaceae. II. Pythium.**—*Mycologia*, xxiv, 1, pp. 14–61, 21 figs., 1932.

In this, the second paper of this series [*R.A.M.*, xi, p. 129], the author deals with the genus *Pythium*, to which he refers all the species previously included in the subgenus *Sphaerosporangium* [cf. ibid., xi, p. 330]. After a discussion of the morphological characters which he suggests as a basis for the taxonomic subdivision of the genus, he gives detailed descriptions [including Latin diagnoses of the new forms] of 19 species or varieties, among which the following, all isolated [with one exception] in the Hawaiian islands, are considered to be new. *P. allantocladon*, obtained from roots of spinach and believed to be a saprophyte; *P. ascophallon*, from the roots of spinach and *Ricinus communis*; *P. polycladon*, from the roots of *R. communis*; *P. chamaihyphon*, from the roots of papaw; *P. euthyhyphon*, from pineapple roots; *P. acanthophoron*, from the base of diseased pineapple leaves; *P. araisosporon*, from papaw roots; *P. splendens* var. *hawaiianum* n. var., a very aggressive parasite of pineapple roots, and moderately parasitic on those of the pigeon pea (*Cajanus indicus*), *Phaseolus aureus*, *Vigna sinensis*, *Vicia faba*, wheat, sweet potato, *Canavalia ensiformis*, and sunflower; *P. teratosporon*, from spinach roots; *P. irregulare* var. *hawaiiense* n. var., from pineapple roots, *P. polymorphon*, from the same host (a morphologically similar form was examined by the author from diseased tobacco roots in Kentucky); *P. artotrogus* var. *macracanthum* n. var., from pineapple roots; *P. diameson*, from pineapple roots; and *P. plerosporon*, from diseased tobacco roots in Kentucky. The paper also includes a key for the identification of the species dealt with. It is concluded that the morphological characters of the oospores and, to a certain extent, of the antheridia of all species of *Pythium* are fairly constant except for normal variations.

JACKSON (H. S.). **The rusts of South America based on the Holway collections. VI.**—*Mycologia*, xxiv, 1, pp. 62–186, 1932.

This further list of South American rusts collected by Holway [*R.A.M.*, xi, p. 404] gives descriptions of, and notes on 219 species occurring on representatives of the Verbenaceae, Labiatae,

Solanaceae (including 10 species on the genus *Solanum*), Scrophulariaceae, Bignoniaceae, Acanthaceae, Rubiaceae, Valerianaceae, Cucurbitaceae, and Carduaceae. Out of this number 115 are described as new to science, and their Latin diagnoses are appended.

SCHWEIZER (G.). **Über die Kultur von Rhytisma acerinum (Pers.).** [On the culture of *Rhytisma acerinum* (Pers.).]—*Planta*, xvi, 2, pp. 367–375, 3 figs., 1 diag., 1932.

Considerable difficulty was experienced by the writer in obtaining the perfect stage of *Rhytisma acerinum* [*R.A.M.*, viii, p. 274] in pure culture, but eventually apothecia and sclerotia developed in profusion in cultures exposed to sharp fluctuations in temperature (from ice or outdoor winter cold to room temperature). The following medium was found to be suitable: 150 gm. of coarsely ground dried maple (*Acer platanoides*) leaves, 50 gm. dried maple sawdust, 0·5 gm. potato or wheat starch, 0·5 gm. dextrose, 0·1 gm. asparagin, 0·1 gm. nitrophoska, 0·1 gm. magnesium sulphate, 0·1 gm. humic acid (Merck), and 0·1 gm. chitin. Sterilization may be effected by six days' exposure in a specially constructed vessel to the fumes of absolute alcohol, mixtures of chloroform and alcohol, formaldehyde, or toluol.

BRIEN (R. M.). **Host range of Sclerotinia sclerotiorum in New Zealand.**—*New Zealand Journ. of Agric.*, xliv, 2, pp. 127–129, 2 figs., 1932.

A list is given (showing the botanical and common names and the parts affected) of 39 plant species belonging to 12 families known to be attacked by *Sclerotinia sclerotiorum* in New Zealand, where this fungus is stated to be present on a wider range of hosts than any other species of *Sclerotinia* [*R.A.M.*, vii, p. 6].

SMITH (F. E. V.). **Sclerotium disease.**—*Journ. Jamaica Agric. Soc.*, xxxvi, 3, pp. 129–130, 1932.

In Jamaica *Sclerotium rolfsii* is very common on Irish potatoes, sweet potatoes, and tomatoes, but it can attack almost all the kinds of vegetables and flowers grown in the island; it is not, however, at all common on sugar-cane. Under greenhouse conditions the fungus may be controlled by sterilizing the soil by steam, while if it is widely prevalent in the field, the land should be left fallow for some years. In moderate-sized gardens the affected plants should be removed and burnt at the very first sign of attack. Where the disease is known to be present in the soil, Cheshunt compound [*R.A.M.*, i, p. 373] should be applied to the soil at intervals throughout the life of the crop, and any diseased plants promptly removed.

MENDOZA (J. M.). **Two new species of sooty molds from the Philippines.**—*Philipp. Journ. of Sci.*, xlvii, 2, pp. 289–291, 293, 2 pl., 1932.

Technical diagnoses are given in English of two new species of sooty moulds (Capnodiaceae) occurring in the Philippines, viz., *Scorias philippinensis* on *Ficus hauili* and *Parascorias spinosa* (cf. *Ann. Mycol.*, xxviii, p. 366, 1930) on *Smilax* sp.

S. philippinensis is characterized by a slimy, closely interwoven, straw-coloured to dark brown mycelium; stalked ovate or piriform, obtuse or acuminate, greenish-black perithecia, 100 to 159 by 82 to 130 μ; and obovate to clavate, thick-walled, aparaphysate asci, 40 to 57 by 12 to 13 μ, containing eight hyaline, cylindrical, triseptate ascospores, tapering at one end, 21 to 23 by 3 to 4 μ. Cylindrical pycnidia ranging from 40 to 528 by 13 to 26 μ are also formed.

P. spinosa is characterized by a gelatinous, amber-coloured to dark brown mycelium, furnished with blunt, coarse spines and composed of rounded or, occasionally, cylindrical cells, the former measuring 3·2 to 11·5 μ in diameter and the latter 8 to 9·6 by 3·5 to 6·4 μ; ostiolate, almost cylindrical or occasionally oval perithecia, 60 to 143 by 41 to 47 μ; and cylindrical to clavate, thick-walled, aparaphysate asci, 47·8 to 57·5 by 15·5 to 16·5 μ, containing eight hyaline, cylindrical, uniseptate ascospores, tapering at one end, 14 to 16 by 3 to 4·3 μ.

KOOLHAAS (D. R.) & BOEDIJN (K. B.). **De 'Theeschimmel' in Nederlandsch-Indië (Voorloopige Mededeeling).** [The 'tea fungus' in the Dutch East Indies (preliminary note).]—*De Bergcultures*, vi, 12, pp. 299–303, 2 graphs, 1932.

An account is given of the so-called 'tea fungus' (consisting chiefly of *Bacterium xylinum* and *Saccharomycodes ludwigii* with various other bacteria and yeasts), the cultivation of which in a tea infusion or extract with 10 per cent. sugar is stated to produce, in two to four days, a slightly acid liquid of agreeable aromatic flavour with valuable medicinal properties extensively used in the villages in Java. Full directions are given for the preparation of this beverage.

JACOBSON (H. G. M.) & SWANBACK (T. R.). **Manganese content of certain Connecticut soils and its relation to the growth of Tobacco.**—*Journ. Amer. Soc. Agron.*, xxiv, 3, pp. 237–245, 1932.

Observations and experiments in Connecticut have shown that a high amount of active manganese in a soil is toxic to tobacco, resulting in the production of plants with definite abnormalities. Manganese toxicity symptoms occurred in plants grown in solution cultures when the concentration of manganese was as low as 1 p.p.m. The first symptom of the injury was a yellowing of the top leaves, the discoloration being minutely distributed in the interspaces of the finest ramifications of the leaf veins and most pronounced towards the tip of the leaf. In the later stages of growth the entire leaf assumed a more yellow colour, but the 'pattern' remained the same. Later still, some of the leaves developed crinkled and brown, irregular spots. Tobacco plants grown in sand cultures showed pathological symptoms at an early stage following the admixture of 80 p.p.m. of manganese. In field tests no injury was caused by the use of manganous sulphate (486 lb. per acre), the deleterious effects of which were found to be neutralized by the presence of lime in the soil.

BALD (J. G.) & SAMUEL (G.). **Investigations on 'spotted wilt' of Tomatoes. II.**—*Australia Council Sci. & Indus. Res. Bull.* 54, 24 pp., 8 figs., 2 diags., 1931.

Further investigations conducted in Australia into spotted wilt of tomatoes [*R.A.M.*, x, p. 65] have resulted in the following additional observations on the symptoms of the disease. Under good growing conditions the check to growth caused by the disease lasts some two to three weeks. Growth is then gradually resumed, and after a few weeks there is frequently quite an appreciable amount of secondary growth, though as a rule some of the leaves are mottled and deformed. Bronzing occasionally appears on the secondary growth, especially in the field. No evidence was obtained that spotted wilt is due to a mixture of viruses.

The characteristic mottling of ripe fruit in variable but frequently concentric patterns, previously attributed by the authors to spotted wilt, could not be definitely connected with the disease by inoculation tests. Mottled fruits sometimes occur on plants showing no other definite symptoms of the disease, while diseased plants are sometimes found bearing fruit that is not mottled.

By mechanical inoculation with juice from the leaves, stems, roots, and green fruits of recently diseased tomato plants, evidence was obtained that the virus is present in all these parts, but no evidence could be found of its presence in ripe fruits. As the virus is readily destroyed by ageing and heat, it is thought possible that it may disappear in the fruit as a result of the chemical changes associated with ripening.

A description is given of an inoculation method which enables the disease to be transferred with almost unfailing success. This consists in wiping the leaves with muslin dipped in virus so that the hairs of the leaf are broken but the mesophyll tissue remains uninjured. The virus should be taken from a recently diseased tomato plant and wiped over about six leaflets of the plant which is being inoculated.

At room temperature the virus loses most of its potency within three hours and all of it within six hours. It is killed by heating for ten minutes at about 42° C. Filterability could not be determined, as filtration could not be effected before loss of potency through ageing.

Adult *Frankliniella insularis* thrips in order to transmit the disease must, apparently, have fed on an affected plant during their larval life. Under medium temperature conditions the incubation period of the virus in the larva is thought to lie probably between five and seven days.

Spotted wilt was experimentally transferred from tomatoes to tobacco and 14 other species of *Nicotiana*, as well as to 7 species of *Solanum*, *Capsicum annuum*, *Datura stramonium* [cf. ibid., x, p. 694], *Hyoscyamus niger*, *Lycium ferocissimum*, *Petunia hybrida*, *Physalis peruviana*, *Salpiglossis* sp., *Schizanthus* sp., *Aster* sp., and *Chrysanthemum* sp.

Iceland poppy (*Papaver nudicaule*), nasturtium (*Tropaeolum majus*), and *Zinnia elegans* growing in suburban gardens were found to be naturally infected with spotted wilt and were also successfully inoculated with the disease under experimental

conditions. Iceland poppies are widely grown in Adelaide during winter when no tomatoes are grown outdoors, and in some seasons were frequently found infected with the spotted wilt virus. The symptoms on the various hosts are briefly described. The authors have recently obtained evidence confirming the work of Pittman [ibid., vii, p. 410] in Australia and Smith in England [ibid., x, p. 694] in establishing that *Thrips tabaci* is also a vector of spotted wilt.

ARNAUD (G.) & BARTHELET (J.). **Recherches sur les dépérissements des arbres d'alignement.** [Researches on the dying-off of road-side trees.]—*Ann. des Epiphyties*, xvii, 4, pp. 249–323, 7 pl., 34 figs., 4 diags., 5 graphs, 1931. [Received May, 1932.]

In the first part of this paper the authors give a detailed account of their study of the disease of *Ailanthus* (chiefly *A. glandulosa*) trees in Paris, a brief notice on which has already been published [*R.A.M.*, ix, p. 735]. The trouble is now stated to have been first observed and described by Mangin in 1894 in a few isolated points of the city, from which it has very gradually but steadily spread, until now it is present in every group of these trees within the metropolitan area and in some of the suburbs. The economic importance of the disease is indicated by the fact that out of 7,400 *Ailanthus* trees which lined the thoroughfares of Paris some thirty years ago, less than 2,000 were still living at the time of the authors survey, of which not more than a half were in good health.

Observations, supported by the authors' inoculation experiments, showed that trees of any age may be infected. The disease does not cause any visible symptom in the earlier stages, beyond a defoliation followed by death of one or two limbs of the crown, usually during the winter. Except in a few cases of inoculated young trees, no sudden wilting of the foliage was noticed. The affected trees generally perish in the second or third year after the death of the first branches, but a few may die at the end of a year. The only histological features observed in affected trees is the discoloration of the wood described in the previous paper, and the presence in its vessels and cells of the mycelium of *Verticillium dahliae* [loc. cit.], a morphological, cultural, and taxonomic account of which is given. It is pointed out that while the organism produced sclerotia freely in pure cultures and in inoculated potato plants, these bodies were rarely found in the wood of the affected *Ailanthus* trees. Details are also given of inoculation experiments which proved the pathogenicity of the fungus under controlled conditions to the sycamore (*Acer pseudoplatanus*), *Ailanthus* spp., the potato, and possibly also to apricots. Some space is given to a discussion of various hypotheses to explain the mode of entry of the causal fungus, and also of the environmental factors that favour infection, but no conclusive evidence on these points was supplied by the investigation. Control of the disease, beyond the replacement of the *Ailanthus* trees by immune species, is considered to be impracticable.

The second part of the paper briefly reviews the causes of the dying-off of elm trees in Paris, among which *Graphium ulmi* [ibid., xi, pp. 274, 275, *et passim*] does not appear to play a preponderant part, although the disease due to this fungus is widespread in France and is particularly destructive at Versailles. The disease in the avenues of elms in Paris is considered to be due chiefly to insect injury during the hottest months of the year. The elm disease now known to be due to *G. ulmi* appears to have been reported in France for the first time by Graffin (*C. R. Acad. d'Agric., Paris*, vi, pp. 23–30, 1920) and Guyot [*R.A.M.*, i, p. 334], though the former attributed it to the effects of gases used during the war.

BURGER (F. W.). **Bacterieziekte van de Wilg.** [Bacterial disease of the Willow.]—*Nederl. Boschbouw-Tijdschr.*, v, 3, pp. 75–84, 3 figs., 1932.

An account, based mainly on the investigations of W. R. Day and Miss E. J. Lindeijer, is given of the bacterial disease of willows [believed to be similar to the disease attributed to *Bacterium salicis* in England] affecting *Salix caprea, S. viminalis, S. purpurea, S. amygdalina, S. triandra*, and probably other species in Holland [*R.A.M.*, xi, p. 411].

ASHCROFT (J. M.). **Black Walnut canker caused by a Nectria.**—*Phytopath.*, xxii, 3, pp. 268–269, 1932.

Out of 104 inoculations on the wounded bark of black walnut (*Juglans nigra*) trees in West Virginia with conidia obtained from ascospores of a red *Nectria* isolated from cankers, 82 (79 per cent.) gave positive results [*R.A.M.*, xi, p. 411]. The fungus was repeatedly reisolated from these artificially induced cankers. Infection spreads more rapidly in a longitudinal direction and the lesion thus appears somewhat spindle-shaped in outline. On one- or two-year-old branches the necrotic tissue may turn dark brown. The whitish sporodochia protrude through the dead tissue, generally at the lenticels.

DEMAREE (J. B.) & COLE (J. R.). **The downy spot disease of Pecans.**—*Journ. Agric. Res.*, xliv, 2, pp. 139–146, 2 figs., 1932.

The authors state that observations since 1926 have shown that the downy spot disease of pecans (*Hicoria* [*Carya*] *pecan*) first recorded from southern Georgia [*R.A.M.*, vii, p. 254] occurs over a wide area in the south-western part of the United States, and that it is more destructive in some localities of the drier regions of Louisiana and Texas than elsewhere. It was also found that during late summer small pycnidium-like structures, 43 to 50 μ wide, form in the affected leaf tissues; these structures contain minute rod-shaped, spore-like bodies which so far have failed to germinate in water. During autumn and winter aggregated perithecia develop either in irregular rings surrounding the old downy spots or directly on the lesions, the former being distinctly larger

than the latter. The perithecia are hypophyllous, black, erumpent, ellipsoid-globose, ostiolate, and 50 to 85 μ in diameter. The eight-spored asci are clavate-cylindrical, hyaline, and measure 45 to 55 by 7·5 to 9 μ. The spores are hyaline, one-septate, the two cells being slightly unequal in size, and 12 to 15 by 3 to 5 μ. The genetic connexion of these perithecia with the conidial stage was demonstrated both in culture and by inoculation experiments. On this ground the causal fungus, which had first been tentatively identified as *Cylindrosporium caryigenum* [loc. cit.] and was subsequently transferred by von Höhnel to *Cercosporella caryigena* [ibid., iii, p. 687; x, p. 646] is now named *Mycosphaerella caryigena* comb. nov., the diagnosis of which in English in appended.

The actual damage done by the disease to pecans has not yet been established, but observations made so far indicate that, should it become destructive, it may be difficult to control, since it does not appear to be checked by the applications of monohydrated copper sulphate and lime dust used for the control of pecan scab [*Cladosporium* sp.: ibid., vi, pp. 106, 107].

BAXTER (D. V.). **Some resupinate Polypores from the region of the Great Lakes. III.**—*Papers Michigan Acad. of Science, Arts & Letters*, xv, pp. 191–228, 10 pl., 1932.

The writer's studies on the occurrence of resupinate Polypores in the region of the Great Lakes indicated that few of them play any appreciable part in the decay of timber. *Poria subacida* is the most important of these [cf. *R.A.M.*, vi, p. 265; viii, p. 412], feather rot and windfall associated with the presence of this fungus being prevalent in almost all balsam (*Abies balsamea*) stands in the northern section of the Lake States, while other substrata for the organism include white and jack pines [*Pinus strobus* and *P. banksiana*], birch, tamarack [*Larix americana*], spruce, hemlock [*Tsuga* spp.], and black ash [*Fraxinus nigra*].

A key to the species of *Poria* (excluding the brown ones) in the Great Lakes region is included, together with a list of Polyporaceae (mainly *Poria* spp.) new to, or little known in, the districts under observation.

HEMMI (T.) & KURATA (S.). **Pathological studies on Polyporus betulinus (Bull.) Fr.**—*Forsch. auf dem Geb. der Pflanzenkrankh.*, Kyoto, 1, pp. 206–224, 2 pl., 3 figs., 1931. [Japanese, with English summary.]

The decay of birches caused by *Polyporus betulinus* [*R.A.M.*, viii, p. 745] in Japan starts from the sapwood and advances inwards very irregularly, so that, while the heartwood is attacked, portions of the sapwood remain sound. The rotted wood becomes soft and light, crumbling readily to a brown powder. Pure cultures of the fungus were grown on apricot decoction, dilute Japanese soy with onion decoction, and a number of other media, mycelial growth being generally more vigorous on agar than on liquids. The loose aerial mycelium gradually turned from white to light brown. By microchemical tests and cultural experiments (using Bavendamm's method) [ibid., vii, p. 68; viii, p. 281], the writers

classified the fungus as belonging to the cellulose-dissolving group. The minimum, optimum, and maximum temperatures for mycelial growth were found to be about 5°, 28°, and 36° C., respectively. Contact between cultures of *P. betulinus* and those of any other wood-rotting fungi in the presence of light usually resulted in the overgrowth of the latter by the former.

POMERLEAU (R.). **Distribution da la rouille vésiculeuse du Pin blanc dans la province de Québec.** [Distribution of blister rust on White Pine in the province of Quebec.]—*ex Eleventh Ann. Rept. Canadian Plant Disease Survey 1931*, pp. 105–107, 1 map, 1932. [Mimeographed.]

Blister rust (*Cronartium ribicola*) of white pines [*Pinus strobus*] was found in almost all the 35- to 100-year-old plantings, covering an area of 107,604 acres, inspected in the province of Quebec during 1931 [cf. *R.A.M.*, v, p. 526; ix, p. 420]. In some areas nearly 20 per cent. of the trees bore one or more cankers, the average incidence of infection being 1 to 7 per cent. The age of the cankers varies from 3 to 7 years, the majority dating from 1926–7. The predominant species of *Ribes* is undoubtedly *R. glandulosum* [ibid., vii, p. 349], on which the rust is practically always present, followed by *R. cynosbati* [ibid., ii, p. 4], *R. triste* [ibid., viii, p. 413] var. *albinervum*, *R. lacustre* [ibid., vii, p. 349; x, p. 698], and *R. americanum*, all of which are susceptible. Black currants (*R. nigrum*), which are extensively cultivated in Quebec, are an important source of blister rust infection.

In a plantation belonging to the Canadian International Paper Company, where 50 per cent. of the white pines were infected by blister rust, an attempt was made to eradicate the *Ribes* bushes, numbering 600 to 800 per acre, but the expense of the work was found to be prohibitive. Similar operations have, however, been conducted in other plantations on a smaller scale, with the result that 8,860 *Ribes* bushes have been eradicated, an average of 2·28 per acre.

DUFRÉNOY (J.). **L'inégale susceptibilité des Épiceas vis-à-vis du Chrysomyxa rhododendri.** [The unequal susceptibility of Spruces towards *Chrysomyxa rhododendri*.]—*Comptes rendus Soc. de Biol.*, cix, 5, pp. 352–353, 1 fig., 1932.

Spruces in the valley of Barèges, French Pyrenees, situated at an altitude between 1,300 and 1,500 m. above sea level, are stated to be liable to extensive infection by the *Peridermium* stage of *Chrysomyxa rhododendri*, the uredo and teleutospore stage of which occurs on rhododendrons in the same locality [*R.A.M.*, vii, p. 686]. Marked differences in varietal susceptibility are shown by the diseased spruces. In those contracting severe infection the parenchymatous cells of the needles, which are penetrated by haustoria, contain numerous mitochondria and are full of amyloplasts, occupied by several large grains of starch and many small fat globules, while in the more resistant varieties large vacuoles filled with precipitates of phenolic compounds largely replace the amyloplasts.

SCHWALBE (C. G.). **Studien zur Holzkonservierung. II.** [Studies on wood preservation. II.]—*Angew. Chemie*, xlv, 11, pp. 223–227, 1932.

Continuing his investigations on wood preservation [*R.A.M.*, vi, p. 647], the writer found that spruce and pine heartwood is not completely permeated by sodium fluoride immediately after impregnation by pressure, if in the 'green' state. After three years, however, a considerable portion of the disinfectant was found to have penetrated to the centre of the heartwood. Mycological tests by Dr. [J.] Liese at the Eberswalde Forestry College showed that this method affords entire security against fungous infection. The amount of sodium fluoride required for the 'green' treatment is considerably below the 2 per cent. necessary for 'dry' impregnation. Probably the sodium fluoride, besides being toxic to wood-destroying fungi, enhances the firmness and durability of the wood by coagulating the colloidal membranes.

DAWSON (MARION L.). **A study of some vegetable rots occurring in Evanston markets.**—*Trans. Illinois State Acad. Sci.*, xxiii, 3, pp. 131–142, 1 fig., 1931.

In the course of a survey made during the autumn and winter of 1927–8 of the fungous rots of vegetables in the Evanston (Illinois) markets a number of rot-producing fungi, chiefly Mucoraceae and species of *Fusarium*, were recorded for the first time on the hosts in question.

The onion rot caused by *Penicillium gliocladium-clonostachys* was characterized by soft, water soaked areas, which rapidly enlarged and became covered by a white mycelium and later by creamy-white, powdery spore masses. On Blakeslee's agar the fungus produced white colonies tinged with buff. The conidiophores, 24 to 25 μ long, arising from coremial fructifications, bear elliptical, pale green conidia, 4·2 to 4·8 by 2·1 to 3·3 μ.

Inoculation experiments with *Rhizopus arrhizus* [*R.A.M.*, ix, p. 611; x, p. 426], which occurred on pumpkins, gave positive results on tomato, cucumber, sweet potato, eggplant, onion, swede, carrot, squash, pumpkin, green bean [*Phaseolus vulgaris*], and pepper [*Capsicum annuum*]. The decay of eggplant, cucumber, tomato, and other vegetables caused by *R. fusiformis*, isolated from swedes [ibid., viii, p. 81], was noticeably slow. *R. nigricans* was isolated from onions and beans, and its variety *minor* from tomato and sweet potato. The onion strain proved particularly virulent, producing a rapid, wet rot that destroyed all the hosts inoculated in three days. The tomato strain, on the other hand, was a weak parasite. *R. nodosus* was twice isolated from eggplant, on which it behaved as a very vigorous parasite.

Mucor abundans, found on eggplant, caused severe infection on all the ten hosts inoculated (potato, sweet potato, carrot, onion, eggplant, peas, beans, asparagus, tomato, and pepper). *M. hiemalis* from peas failed to infect the first three hosts in this list, but on the others it produced similar results to the foregoing. *M. circinelloides*, found on string beans [*P. vulgaris*], attacked only peas, beans, asparagus, tomato, and pepper.

GIBBS (J. G.). **Control of club-root. Experiments with lime and fertilizers.**—*New Zealand Journ. of Agric.*, xliv, 1, pp. 28–32, 2 figs., 1932.

This is an abridged version of the author's recently published account of his experiments with lime and fertilizers in the control of the club root disease [*Plasmodiophora brassicae*] of cruciferous crops [*R.A.M.*, xi, p. 415].

SNYDER (W. C.). **Seed dissemination in Fusarium wilt of Pea.**—*Phytopath.*, xxii, 3, pp. 253–257, 1932.

Observations and experiments in Wisconsin with varieties of peas susceptible to wilt (*Fusarium orthoceras* var. *pisi*) [*R.A.M.*, xi, p. 86] at a soil temperature of 18° to 24° C. (the optimum for the development of the fungus) indicated that the latter is occasionally carried with seed harvested from infested land. Thus, four wilted plants were grown from 2,100 mixed seeds of the Ashford and Acme varieties, and three from 2,000 of Perfection. This mode of transmission, though comparatively rare, must yet be regarded as a potential source of primary inoculum whereby the wilt organism may be introduced into healthy soil.

MANDELSON (L. F.). **Halo blight—a bacterial disease of Beans.**—*Queensland Agric. Journ.*, xxxvii, 2, pp. 128–133, 2 figs., 1932.

The author states that recently considerable damage has been done to beans [*Phaseolus vulgaris*] in Queensland by a bacterial disease which, in some districts, practically wiped out the crop. Field and laboratory investigations have shown the trouble to be caused by *Phytomonas* [*Bacterium*] *medicaginis* var. *phaseolicola* [*R.A.M.*, xi, p. 418], a brief account of which is given. Control measures are also briefly discussed.

RIKER (A. J.) & RIKER (REGINA S.). **Studies on bacteria associated with the chocolate-spot disease of Broad Beans.**—*Ann. of Appl. Biol.*, xix, 1, pp. 55–64, 2 pl., 1932.

This is a somewhat fuller morphological and cultural account of the bacterium which was isolated in England from broad beans (*Vicia faba*) affected with the chocolate spot disease, and which was briefly described by the first-named author in a previous communication [*R.A.M.*, vii, p. 214]. This strain, as well as another one obtained from Paris on the same host, was shown to be vigorously pathogenic to broad beans and garden peas in the greenhouse, but since the experiments were limited in number and carried out only during one season, it is thought that further work is necessary definitely to establish the connexion between this bacterium and the disease.

Morphologically and culturally, with the exception of a few minor differences, the broad bean organism closely resembles *Pseudomonas seminum* Cayley [ibid., v, p. 469]. Histological examination of broad bean stems inoculated through punctures showed the presence of the organism inside the vessels, in the intracellular spaces, and in the cells of the invaded tissue. A non-pathogenic strain was found which corresponded in bacteriological characters with the pathogenic strains.

Burkholder (W. H.). **Effect of the hydrogen-ion concentration of the soil on the growth of the Bean and its susceptibility to dry root rot.**—*Journ. Agric. Res.*, xliv, 2, pp. 175–181, 1932.

The author states that his field observations and greenhouse experiments [the results of which are presented in tabular form] indicated that in the State of New York the susceptibility of the bean (*Phaseolus vulgaris*) to dry root rot (*Fusarium martii phaseoli*) [*R.A.M.*, x, p. 161] is not affected by the hydrogen-ion concentration of the soil. The general health of the host appears also to be little affected by this factor.

Mackie (W. W.) & Esau (Katherine). **A preliminary report on resistance to curly top of Sugar Beet in Bean hybrids and varieties.**—*Phytopath.*, xxii, 3, pp. 207–216, 6 figs., 1932.

This is an expanded and fully tabulated account of the writers' investigations in California on varietal resistance to curly top of sugar beet among bean (*Phaseolus vulgaris*) hybrids and varieties, a preliminary note on which has already appeared [*R.A.M.*, xi, p. 219].

Verderevsky (D.). Виды **Sclerotinia,** вызывающие кагатную гниль Сахарной Свеклы. [Species of *Sclerotinia* causing storage rot of Sugar Beet.]—*Наукові Записки з Цукрової Промисловости.* [*Sugar Industry Scient. Notes*], Kieff, ix, 16–17, pp. 247–263, 2 pl., 1932. [French summary.]

The author states that a serious winter storage rot of sugar beet in the Ukraine is caused by a species of *Sclerotinia* which differs markedly in its morphological and cultural characters from *S. libertiana* [*S. sclerotiorum*], while closely agreeing with Ramsey's description of *S. intermedia* [*R.A.M.*, iv, p. 12; v, p. 269: but cf. vii, p. 6]. Experiments [considerable details of which are given] showed that under the local conditions various strains of *S. sclerotiorum* isolated from a wide range of natural hosts were unable to attack the stored beets. On the other hand, the local strain, provisionally identified as *S. intermedia*, was shown to grow well at temperatures below 0° C. on the beets, the saccharose content of which is rapidly and completely inverted by it. In culture on moist filter paper it produced an enzyme capable of breaking down cellulose, indicating that it is able rapidly to dissolve the cell walls of the host tissue. When cultured on sugar beet it produced an abundance of oxalic acid, but it was unable to grow on substrata with an alkaline reaction. This suggests a possible means of controlling the rot by mixing slaked lime with the beets.

So far the area of dispersion of the fungus appears to be limited to the neighbourhood of the Ramogne Plant Protection Station; in view, however, of the seriousness of the losses caused by it in that region, special precautions should be taken to prevent its further spread.

Drake (C. J.), Harris (H. M.), & Tate (H. D.). **Insects as vectors of yellow dwarf of Onions.**—*Science*, N.S., lxxv, 1943, pp. 341–342, 1932.

In the insectary at Ames, Iowa, yellow dwarf of onions [*R.A.M.*,

xi, p. 420] has been transmitted to a large number of onion plants by *Aphis rumicis*, *A. maidis*, and *Rhopalosiphum prunifoliae*, as well as by the leafhopper *Cicadula sexnotata*. Observations indicate that the two first-named, which are commonly found feeding on onion leaves in the Pleasant Valley, are responsible for a large percentage of the transmitted infection. In more than 200 definite transmissions the yellow dwarf symptoms appeared seven to twelve days after the initial exposure to viruliferous aphids. Plants thus infected were successfully used for the infection of other plants. In over 100 tests during February, 1931, 91 per cent. of the caged plants showed typical yellow dwarf symptoms within twelve days. Regardless of the portion of the plant on which the aphids had been confined, the first visible sign of the disease always appeared in the new shoots, and in some of the larger onions no indications of infection ever developed in the older leaves exposed to feeding by the insects.

TEMPLE (C. E.). **Some diseases of Cantaloupe and Cucumber.**—*Trans. Peninsula Hort. Soc. 1931*, Delaware, xxi, 5, pp. 35–41, 1932.

A brief popular account is given of the chief parasitic diseases which attack melon and cucumber crops in the Delaware peninsula, among which leaf blight (*Macrosporium cucumerinum*) [*Alternaria cucumerina*: *R.A.M.*, x, p. 771] is stated to be present in all fields and to cause considerable damage unless adequate control measures are taken. The distribution of melon and cucumber mosaic is still sporadic in the region, and there was clear evidence that the further spread of the disease may be checked by the eradication of perennial weeds [ibid., vi, p. 333] in which the disease overwinters, and the destruction of all infected melon and cucumber plants as soon as they appear. Some space is given to the discussion of control measures against the diseases dealt with, including the preparation and application of Bordeaux mixture and various fungicidal dusts.

PORTER (D. R.) & MELHUS (I. E.). **The pathogenicity of Fusarium niveum (EFS) and the development of wilt resistant strains of Citrullus vulgaris (Schrad.)**—*Iowa Agric. Exper. Stat. Res. Bull.* 149, pp. 123–184 a, 12 figs., 1932.

The present acreage of watermelons in Iowa is stated to be 90 per cent. less than before wilt (*Fusarium niveum*) became a limiting factor [*R.A.M.*, xi, p. 422 and next abstract].

Comparative physiological tests made with 18 cultures of the wilt organism from Iowa, North and South Carolina, Georgia, Tennessee, West Virginia, California, Arkansas, and Mississippi showed differences in the rate of growth on artificial media, type of pigmentation, rate of starch digestion, ability to change the hydrogen-ion concentration of neutral media, general growth habit, and degree of sporulation.

Seedling rot due to *F. niveum* is more severe at a soil temperature of 16° to 18° than at 22° to 25° or 25° to 28° C., whereas seedling wilt causes heavier damage at the last-named temperature than at lower ones. The application of lime, manure, and

commercial fertilizer in varying proportions to infested soil failed to reduce infection in the Kleckley Sweet variety.

Slight differences have been observed in the relative susceptibility of edible watermelon varieties, that known as 'Japan No. 7' being the most satisfactory of those tested. The relative resistance of inedible varieties varies greatly, Preserving Citron being the most susceptible and White Seeded and Majorta the most resistant among those used in the trials. Five hybrids between Conqueror and the varieties Kleckley Sweet, Tom Watson, Halbert Honey, and Excel (all edible varieties) were more resistant than the parents in 1928 and 1929, the relative resistance in the former year of these hybrids being as follows: hybrid 30, 46 per cent.; 33, 59 per cent.; 43, 22 per cent.; 90, 35 per cent.; and 137, 55 per cent., compared with the 99 per cent. susceptible Kleckley Sweet. Two hybrids, Q21 and Q23, showed 68 and 64 per cent. resistance, respectively, in 1928 when all the above-mentioned, named, edible varieties, as well as Thurmond Grey and Dixie Belle, were almost entirely susceptible. F_2 hybrids between Preserving Citron and Tom Watson proved resistant to wilt but highly susceptible to mosaic [cf. ibid., xi, p. 349]. F_2 hybrids between White Seeded and Halbert Honey were resistant to wilt in 1927 and 1928.

MILLER (J. W.). **Progress report on the Watermelon wilt project in Illinois.**—*Trans. Illinois State Acad. Sci.*, xxiv, 2, pp. 124–129, 1931.

So far the results obtained since 1926 in Illinois in the selection of a watermelon variety resistant to wilt (*Fusarium niveum*) [see preceding abstract] are not very encouraging, but hybridization experiments have been more successful. Seven hybrid strains in the F_3 and F_4 generations between the Kansas stock melon and different commercial varieties (Halbert Honey, Tom Watson, Conqueror, and Thurmond Grey) are very promising, both as regards resistance to wilt and other desirable qualities. In 1930 these strains produced 25 to 50 per cent. of a normal crop under the most adverse conditions, whereas all the standard varieties used as controls succumbed to wilt. Resistance to *F. niveum* appears to be correlated with the presence of green colouring in the seeds, hundreds of hybrids lacking this character having proved susceptible.

BEAUMONT (A.), HODSON (W. E. H.), & STANILAND (L. N.). **Eighth Annual Report of the Seale-Hayne Agricultural College, Newton Abbot, Devon, for the year ending September 30, 1931.**—25 pp., 1932.

The following are some of the items of phytopathological interest occurring in this report. The Roscoff varieties of broccoli [*Brassica oleracea* var. *botrytis*] maintained their resistance to ring spot (*Mycosphaerella brassicicola*) [*R.A.M.*, ix, p. 230].

Fungous diseases of flowers were exceptionally severe in the spring of 1931, the losses from this cause in west Cornwall, where humidity was extremely high, being probably unprecedented. The

most serious was iris 'rust' (*Heterosporium gracile*) [*Didymellina macrospora*: ibid., ix, p. 38], which affected all varieties except the earliest, such as Wedgwood. *Ramularia macrospora* [ibid., ix, p. 623] was isolated in numerous cases from *Narcissus* [*poeticus*], chiefly from the *ornatus* varieties. *Puccinia pruni-spinosae* was very prevalent on anemones, causing failure of flowering [ibid., xi, p. 249]. The anemone crop being of much greater value in the west country than plums (the alternate host of the rust), the eradication of the latter is recommended.

All the early potato varieties grown in Devon and Cornwall are highly susceptible to blight [*Phytophthora infestans*: ibid., ix, p. 623]. Since 1929 the meteorological data determined by Dutch workers as likely to result in blight outbreaks [cf. ibid., xi, p. 123] have been summarized and applied to the conditions prevailing at Seale-Hayne. The value of the Dutch rules as indications of the likelihood of epidemics was again demonstrated during the period under review, even though infection does not occur with quite such regularity as predicted. In 1931 humidity was high (75 per cent. or above) on 14 days in May, 16 in June, 14 in July, and 16 in August, exceptionally favourable periods for the development of the fungus being from 4th to 12th June and 9th to 15th July. In 1929 and 1930 blight was much less severe and did not begin until August. In each year the critical humidity for the development of *P. infestans* appears to be over 70 per cent. for the average of the afternoon readings.

Heavy losses were caused in the older strawberry plantations of the Tamar Valley by the fruit rot due to *P. cactorum* [ibid., x, p. 435], complete control of which was obtained, however, by dressing the beds with straw before the appearance of infection. In one case where the work of strawing was left incomplete, the fruits on the side of the row where straw had been laid were perfectly healthy, while those on the other side, in contact with the soil, were nearly all rotted.

Krankheiten und Beschädigungen der Kulturpflanzen im Jahre 1929. [Diseases and pests of cultivated plants in the year 1929.]—*Mitt. Biol. Reichsanst. für Land- und Forstwirtsch.*, 43, 3 graphs, 30 maps, 1932.

This survey of the fungous diseases and insect pests attacking cultivated plants in Germany during 1928 is compiled on the same lines as the previous report [*R.A.M.*, x, p. 584]. The distribution of the following diseases (amongst others) is shown by means of maps: barley stripe (*Helminthosporium gramineum*), foot rots of cereals (*Ophiobolus herpotrichus*, *Leptosphaeria herpotrichoides*, *Fusarium* spp., etc.) [ibid., xi, p. 444], blackleg, late blight, and scab of potatoes (*Bacillus phytophthorus*, *Phytophthora infestans*, and *Actinomyces* [*scabies*: ibid., xi, p. 320]), root rot of beets (*Pythium de Baryanum*, *Phoma betae*, and *Aphanomyces levis*), heart and dry rot of beets [ibid., xi, p. 149], clover rot (*Sclerotinia trifoliorum*) [ibid., x, p. 669], finger-and-toe of cabbage (*Plasmodiophora brassicae*), and apple and pear scab (*Fusicladium dendriticum* and *F. pirinum*) [*Venturia inaequalis* and *V. pirina*].

Uppal (B. N.). **India: Rhizoctonia bataticola on Sorghum. Sclerotium rolfsii on Cotton in Bombay.**—*Internat. Bull. of Plant Protect.*, vi, 3, p. 38, 1932.

Rhizoctonia bataticola [*Macrophomina phaseoli*] has been definitely shown by controlled experiments to be pathogenic to sorghum under certain conditions of soil moisture in the Bombay Presidency [*R.A.M.*, xi, p. 38]. Severe damage was caused by this fungus to the last winter sorghum crop in the experimental plots at Mohol, probably owing to the heavy rains in early December, 1931. *Sclerotium rolfsii* has been reported for the first time to be causing injury to cotton under field conditions in the Bombay Presidency.

Adams (J. F.). **Report of the Plant Pathologist for 1931.**—*Quart. Bull. State Board of Agric., Delaware*, xxii, 1, pp. 3–31, 5 figs., 1932.

Popular notes are given on the prevalence of plant diseases in Delaware during 1931 [cf. *R.A.M.*, x, p. 645], accompanied by tables showing (1) the comparative efficacy of various sulphur fungicides in the control of black rot of apple (*Physalospora malorum*) [*P. cydoniae*]; (2) the incidence of infection by sooty blotch (*Gloeodes pomigena*) [ibid., xi, p. 365] on Grimes and Stayman apples treated with various forms of sulphur; (3) a comparison of russeting on apples sprayed with different materials; and (4) the relative defoliation of peach trees by various spray combinations.

Contrary to the results obtained in 1930, *P. cydoniae* was held in check by copper-containing fungicides but not by sulphur sprays. The best control of *G. pomigena* was given by commercial lime-sulphur 2½ in 100, dry-mix 6 lb. and dry lime-sulphur 1 lb. in 100 galls., and kolofog 8 lb. in 100 galls. Colloidal copper (2 lb. in 100 galls.) caused the most severe russeting on Grimes, Jonathan, Stayman, and Paragon apples (33, 42·5, 34·2, and 30·1 per cent., respectively). Peach defoliation was most in evidence where lead arsenate and sulphur sprays were used.

Meeting agriculture's old and new problems with the aid of science.—*Forty-eighth Ann. Rept. Wisconsin Agric. Exper. Stat. for year ended June 30, 1931* (*Bull.* 421), 152 pp., 37 figs., 7 diags., 2 graphs, 1932.

The following are some of the items of phytopathological interest in this report additional to those already noticed from other sources. As a result of the systematic campaign against stripe disease and covered smut of barley [*Helminthosporium gramineum* and *Ustilago hordei*], the loss from these diseases in Wisconsin was only 205,000 bushels in 1931 as compared with 556,000 in 1927. An important factor contributing to this improvement has been the extended use of the stripe-resistant Wisconsin 37 and 38 varieties.

S. S. Ivanoff and A. J. Riker found that the causal organism of Stewart's wilt disease of maize (*Aplanobacter stewarti*) [*R.A.M.*, xi, p. 446] enters young plants by way of the soil through wounds. In the leaves the bacteria were found to escape from the vascular system into the surrounding tissue, where they produce long, water

soaked, pale green stripes. They were further detected in the vascular system of the tassel and in the seed, but not in the embryo. *A. stewarti* grows well with glycerine and ammonium salts as sources of carbon and nitrogen, respectively. It develops well in media with a high oxidization-reduction potential and shows exceptional tolerance for sodium chloride and sodium taurocholate. With this information a differential medium has been developed to facilitate the study of the soil relations of the wilt organism.

J. C. Walker and W. H. Pierce are making a study of the reaction of some standard bean (*Phaseolus vulgaris*) varieties to the Refugee and Robust strains of mosaic [ibid., xi, p. 417], the former being the common leaf curling and mottling virus, and the latter affecting (under natural conditions) only the Michigan Robust variety. Pronounced mottling and leaf curl, with slight dwarfing, was shown by Refugee Stringless Green Pod, Refugee Wax, Red Valentine, Dwarf Horticultural, Mahogany Red Kidney, Mexican Tree, and commercial Great Northern inoculated with the Refugee strain. Among the varieties tolerant to this strain are Improved Kidney Wax, Brittle Wax, Full Measure, Longfellow, and Giant Stringless, in which there is only a slight yellowing and thickening of the leaves. Highly resistant or immune varieties include Michigan Robust, several Great Northern strains developed at the Idaho Station, and Corbett Refugee, a selection from the commercial Refugee Stringless Green Pod. The above-mentioned susceptible varieties, on inoculation with Robust mosaic, become distinctly yellowed, brittle, dwarfed, and usually die, typical mottling being present. In resistant varieties the mottling consists of small granular interspersions of dark and pale green, accompanied in Corbett Refugee by slight leaf curl.

J. C. Walker and C. B. Sumner found that tomato leaf mould (*Cladosporium fulvum*) occurs over a wide range of greenhouse temperatures, but a high degree of moisture is essential to the development of the fungus which may be controlled, therefore, by maintaining the relative humidity below 80 per cent. [cf. ibid., x, p. 630].

Catechol, a phenolic substance (2, 3 dihydroxy benzene) detected by K. P. Link in the red and yellow scales of onions, was shown by J. C. Walker to be highly toxic to the spores of the smudge and neck rot fungi [*Colletotrichum circinans* and *Botrytis* spp.: cf. ibid., x, pp. 499, 701].

Infectious hairy root of nursery apple trees [*Bacterium rhizogenes*: ibid., xi, p. 461] was observed by E. M. Hildebrand and A. J. Riker to be spread by insects eating the galls and other underground parts. The incidence of the disease was considerably reduced by the exclusion of insects from young trees in the field. The host appears to be penetrated exclusively through wounds, and the bacteria are most abundant in the soft, outer tissues of the enlargements. The organism may exist independently in the soil for over a year.

Dudley and Northwestern Greening apples suffered from injury caused by lime-sulphur and flotation sulphur sprays in conjunction with abnormally hot summer weather, up to 20 per cent. of the fruit of the former variety being burnt after treatment on 27th June.

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FAWCETT (G. L.). **Departamento de Botánica y Patología Vegetal.** [Department of Botany and Plant Pathology.]—*Rev. Indust. y Agríc. de Tucumán*, xxii, 1–2, pp. 31–34, 1932.

During 1931 *Cephalosporium sacchari* was isolated from sugarcane setts from La Mendieta, this being the first record of its occurrence in the Argentine. The fungus is apparently confined to poorly growing canes and those damaged by insects or beaten down by wind.

Ring spot [or curly top] was formerly believed to be transmitted from diseased beets to healthy tomatoes by the insect *Agallia sticticollis* [*R.A.M.*, ix, p. 565], but recent experiments with this supposed vector under controlled conditions failed to produce the typical symptoms. On the other hand, positive results were given by tests with various other insects frequenting tomatoes, including *Myzus persicae, Epitrix* sp., and *Dicyphus* sp.

BUTLER (E. J.). **Les fausses analogies entre le 'crown-gall' des plantes et les tumeurs malignes des animaux.** [False analogies between 'crown gall' of plants and malignant tumours of animals.]—*Deuxième Congr. Internat. de Path. Comp.*, Paris, *II. Comptes rendus et Communications*, pp. 563–564, 1931. [Received July, 1932.]

The analogy drawn by certain investigators between crown gall of plants (*Bacterium tumefaciens*) and animal cancer is based, at least in part, on the supposed existence of metastases and the development of embryomata in the former. The so-called 'metastases' of crown gall, however, have been shown by other workers [*R.A.M.*, iii, pp. 15, 386] to be due to two simple processes quite distinct from those of cancer. The first is the elongation of the site of inoculation in plants of rapid growth, accompanied by the formation of secondary galls at a considerable distance above the point of infection, and the second is the passage of the bacteria along the longitudinal intercellular cavities, causing the development of new tumours at the places of active multiplication. In neither case is there any extension of the crown gall tissue into the adjoining healthy parts. The crown gall cells themselves are formed by the division of the host cells into as many as a hundred from a single one.

The so-called 'embryomata' or leafy shoots on the surface of the gall are considered to be merely adventitious formations similar to those formed from the callus of cuttings or as a result of incompatible grafts [ibid., ix, p. 797].

In short, a study of the pathological anatomy of crown gall is not considered to justify any parallel between this disease and animal cancer [cf. ibid., x, p. 778].

HART (HELEN). **Morphologic and physiologic studies on stem-rust resistance in cereals.**—*U.S. Dept. of Agric. Tech. Bull.* 266, 76 pp., 29 figs., 1931.

In discussing and summarizing the results of investigations into the different structures responsible for the morphological resistance of wheat to stem rust (*Puccinia graminis*) and into stomatal behaviour as the principal cause of functional resistance [*R.A.M.*,

xi, p. 439], the author states that wheat seedlings offer virtually no morphological restrictions to the development of rust. In mature plants the size, shape, and disposition of the collenchyma strands in the peduncle are important factors in determining the spread of the mycelium and the size of the rust pustules. Some varieties of common wheats are characterized by very broad and coalesced strands of collenchyma, while others usually have very narrow single strands of collenchyma with strong wide bands of sclerenchyma between them. The durum and emmer wheats have extensive areas of collenchyma, consisting in the former of three to seven or more confluent strands, but usually narrower and isolated in the emmers. The width of the rust-susceptible area of the leaf blade varies in different varieties of wheat and in different species of *Triticum*, but the divergences are seldom sufficient greatly to affect the size of the rust pustules. The leaf sheath contains broad strands of rust-susceptible tissue continuous with those of the leaf blade and not differing greatly in different varieties of wheat. There is relatively little rust-susceptible tissue in the glumes and awns.

Experiments made to determine the effect of fertilizers on the structure of wheat varieties and their susceptibility to rust did not reveal any consistently significant differences in the proportion or distribution of collenchyma in the peduncles. The application to the soil of nitrogenous fertilizers did not increase the diameter of the peduncles of Marquis but did those of Kota, though it was not definitely ascertained whether rust susceptibility was thereby increased. No one fertilizer or combination of fertilizers seemed consistently to change the structure of plants sufficiently to affect their reaction to infection.

Kota wheat plants affected with smut (*Ustilago tritici*) were liable to become more heavily rusted than were originally healthy plants, apparently merely because they remained in the green and susceptible condition somewhat longer than the others.

From the facts available the author concludes that the causes of resistance in wheat to stem rust can be grouped into three general categories, protoplasmic, morphological, and functional.

A bibliography of 52 titles is appended.

DILLON WESTON (W. A. R.). **IV. Studies on the reaction of disease organisms to light. The reaction of disease organisms to certain wave-lengths in the visible and invisible spectrum. II. Reaction of urediniospores to visible light: wave-lengths between 400 and 780 $\mu\mu$.**—*Phytopath. Zeitschr.*, iv, 3, pp. 229–246, 1932.

This is an expanded and fully tabulated account of the writer's studies at the Dominion Rust Research Laboratory, Winnipeg, on the effect of light on the uredospores of wheat rust (*Puccinia graminis tritici*) [*R.A.M.*, xi, p. 166].

The germination of the uredospores of physiologic form 1 (red selection) reached its maximum under the green and blue Wratten Standard filters at a wave-length between 450 and 550 $\mu\mu$. A higher percentage of germination occurred under the green filters Nos. 61 and 58 than under Nos. 66 and 56 green, while the darker

blue filters gave higher germination counts than the light-blue ones. Similar results were obtained with white and yellow-red selections of form 1 of *P. graminis tritici*, forms 52 and 32 (grey), and forms 36, 17, 21, and 9 (red), as well as with *P. graminis avenae* and *P. coronata* [*P. lolii*]. When the uredospores of *P. graminis tritici* 1 were dusted on solutions of Congo red dye (*a*) in light (2 ft. from a 500-watt lamp) and (*b*) in darkness, no germination took place under the former conditions, while under the latter the percentage germination was 83. When light-green dye was used for the same purpose the germination percentages were 66 and 79 respectively. The germination percentages of *P. graminis avenae* on Congo red were 8 and 82 in light and darkness, respectively, the corresponding figures for light-green being 88 and 87.

The admixture of two tints producing white light, e.g., crimson and moss green or scarlet and peacock, inhibits the germination of the uredospores, the tints of the longer (yellow) wave-lengths apparently being responsible for the inhibition.

[An abridged version of this paper appears in *Scient. Agric.*, xii, 6, pp. 352–356, 1932.]

HUBERT (K.). **Beobachtungen über die Verbreitung des Gelbrostes bei künstlichen Feldinfektionen.** [Observations on the spread of yellow rust with artificial field infections.]—*Fortschr. der Landw.*, vii, 7, pp. 195–198, 2 figs., 1 diag., 1 graph., 1932.

An account is given of the successful application of Gassner's and Straib's method of artificial field infection of wheat with yellow rust (*Puccinia glumarum*) at Halle [*R.A.M.*, xi, p. 167]. Plots of the Michigan Bronze variety contracted the disease through the agency of wind-blown spores from the test selections, which were situated at a distance of 100 to 150 m. to the south-west. At the end of June, 1931, when the artificial yellow rust epidemic was supplemented by a severe natural outbreak of brown rust (*P. triticina*), the writer made two aeroplane flights for the purpose of catching spores. The bulk of the spores occurred at the lower altitudes (5,193 per slide measuring 55 by 25 sq. mm. at 30 m. and below, the corresponding figures for 400, 600, and 800 m. being 1,832, 1,222, and 235, respectively). Numerous spores of loose smut of oats [*Ustilago avenae*] were trapped on the same occasions.

FEUCHT (W.). **Die Wirkung des Steinbrandes Tilletia tritici (Bjerkander) Winter und Tilletia foetens (Berkeley et Curtis) Tulasne auf verschiedene Winterweizensorten bei künstlicher Infektion in ihrer Abhängigkeit von äusseren Faktoren.** [The effect of bunt *Tilletia tritici* (Bjerkander) Winter and *Tilletia foetens* (Berkeley & Curtis) Tulasne on different winter Wheat varieties exposed to artificial infection as conditioned by external factors.]—*Phytopath. Zeitschr.*, iv, 3, pp. 247–290, 1 fig., 3 diags., 1 graph, 1932.

Investigations at Jena University showed that moderately low air and soil temperatures at sowing time consistently lead to an increased incidence of wheat bunt (*Tilletia tritici* [*T. caries*] and

T. foetens), while both very high and very low ones tend to reduce it [cf. *R.A.M.*, x, p. 649]. For the Strube's Dickkopf variety the optimum air temperature for infection is between 5° and 6° C., with a corresponding soil temperature, but it is pointed out that other varieties react differently in this respect. Dry soils appear to favour infection by bunt under German conditions, while the preceding crop also exerts an influence on the incidence of infection, which was found to be higher after peas than after wheat. The most effective of the fertilizers used against bunt was found to be calcium cyanamide [ibid., vii, p. 500] at the rate of 6 gm. per kg., but complete freedom from infection was not obtained by this method of treatment.

In several years' varietal reaction tests with the bunt collection Jena-Zwätzen (consisting of 98 to 98·5 per cent. *T. caries* and 1·5 to 2 per cent. *T. foetens*), the only highly resistant variety was Heil's Dickkopf, while Carsten's Dickkopf V, Criewener 104, and Bensing's Trotzkopf were slightly so. Of the varieties tested once only, Hohenheimer 77, Hussar, Ridit, Martin, and White Odessa proved very resistant to the Zwätzen collection, but they were more susceptible to the Halle collection of *T. caries*. The Cosel O.-S. collection was the most virulent towards Hohenheimer 77, followed by that from Breslau.

The writer's observations do not confirm those of Potter and Coons (*Phytopath.*, viii, p. 106, 1918) that wheat ears attacked by *T. caries* present a broader appearance than those infected by *T. foetens* owing to the fact that the smut balls of the former species are thick and swollen, while those of the latter are slender. In both species of *Tilletia* the writer has found swollen as well as slender, almost elongated-oval smut balls, the shape of which seems to be determined more by the wheat variety than by any inherent tendency in the fungus.

In the Heil's Dickkopf variety the percentage of partially diseased plants following artificial inoculation with slightly virulent collections, e.g., those from Göttingen and Hohenheim, was much higher than that obtained with highly virulent bunt strains. In Dornburg wheat the reactions in this respect were completely reversed, indicating a specific varietal response to the different bunt collections. All the bunt collections except Cosel attacked the progeny of Heil's Dickkopf more severely than the original stand, so that in this variety, at any rate, a gradual weakening of the hereditary resistance to bunt must probably be expected.

BRESSMANN (E. N.). **Susceptibility and resistance of Wheat varieties to bunt.**—*Journ. Amer. Soc. Agron.*, xxiv, 4, pp. 249–255, 1 fig., 1932.

The writer tabulates and discusses the results of experiments in 1930–1 on the reaction to bunt (*Tilletia tritici* and *T. levis*) [*T. caries* and *T. foetens*] of nearly 200 wheat varieties in Oregon. The inoculum, which was obtained in 1929 from the Hybrid 128 variety, consisted of a mixture of equal parts of the ten physiologic forms of bunt previously reported [*R.A.M.*, xi, p. 33].

An unusually large amount of infection was secured (up to 100 per cent. in nine varieties while none escaped altogether). The

most resistant varieties were found to be Quality, Ridit, Minard, Beloglina, Ashkof, Bacska, Iobred, Acme, Akrona, Arnautka, Nodak, and Velvet Don. Both Quality and Ridit showed a characteristic partial bunting of the heads, while the two smutted heads in Minard were extensively branched, a phenomenon not hitherto observed in connexion with this disease. In general, the hard red winter and durum wheats were more resistant than the spring varieties (except Quality), but no chromosome group was exempt from attack in these experiments.

ARNAUD (G.) & GAUDINEAU (Mlle). **Le traitement de la carie du Blé. III. (Action comparée des produits cupriques et du formol.)** [The treatment of Wheat bunt. III. Comparative action of copper products and formalin.]—*Ann. Agron.*, N.S., ii, 2, pp. 229–246, 2 graphs, 1932.

This is an expanded and fully tabulated account of the writers' experiments in the treatment of wheat bunt [*Tilletia caries* and *T. foetens*] in France by formalin and various copper-containing products (copper sulphate, copper oxychloride, cupric chloride, and Bordeaux mixture), the main conclusions from which have already been published [*R.A.M.*, xi, p. 442].

KÖCK (G.). **Essig als Saatgutbeizmittel?** [Vinegar as a seed-grain disinfectant?]—*Fortschr. der Landw.*, vii, 8, pp. 226–227, 1932.

In the *Spirituosenzeitung*, 9, 26th February, 1931, an account is given of experiments conducted by Wisniewski at the Botanical Institute, Vilna [Lithuania] in the control of *Ustilago panici-miliacei* on *Panicum miliaceum* [*R.A.M.*, x, p. 181] by 15 minutes' or 1 hour's immersion of the seed-grain in varying concentrations of acetic acid. The incidence of infection was found to be reduced by a 1 per cent. solution but not to the same extent as with formalin; at a strength of 3 or 4 per cent. however, acetic acid proved equally effective with formalin. Applied at concentrations of 3 and 4 per cent. acetic acid reduced the germinability of the seed-grain more than formalin where milk of lime (6 per cent.) was not used after treatment; where this precaution was taken, however, acetic acid could safely be employed at 1 to 4 per cent., the results being superior to those obtained with formalin. Wisniewski concludes that acetic acid would in all probability be equally efficacious against the smuts in general, but a preliminary test of its effects on wheat bunt (*Tilletia tritici*) [*T. caries*] gave inconclusive results.

The writer carried out some experiments at Vienna to determine the action of acetic acid on the germinability of Melker rye, Kadolz and Manitoba wheat, and Princess barley, the outcome of which indicated that considerable risk of injury to the germinative capacity of the cereals is involved in this treatment unless followed by washing with milk of lime. The latter process, however, constitutes an unnecessary complication of the ordinary routine of disinfection which would scarcely be acceptable even if acetic acid should prove unusually effective against wheat bunt.

PICHLER (F.). **Der Einfluss längerer Lagerzeit auf die Keimfähigkeit trockengebeizten Getreides.** [The influence of protracted storage on the germinability of dusted seed-grain.] —*Fortschr. der Landw.*, vii, 8, pp. 217–218, 1932.

Experiments conducted at the Vienna Plant Protection Institute to determine the action of various standard dusts on the germinability of stored wheat seed-grain [*R.A.M.*, xi, p. 361] showed that, contrary to the general opinion, dusting enhances rather than reduces the germinative capacity. The average increase in germinability, after four weeks' storage, of wheat seed-grain treated with abavit B, ceresan, katagel (a pure copper preparation), salvocer, and tillantin was 14·4 per cent., katagel giving the lowest and tillantin the highest figure (7·9 and 18·2 per cent., respectively). All the preparations, however, caused a decrease in germinability during the first week of storage (tillantin the least), and further tests are planned to ascertain the reason for this and other points that are still obscure.

PITTMAN (H. A.). **Take-all and similar diseases of Wheat and how to control them.**—*Journ. Dept. Agric. Western Australia*, 2nd Ser., ix, 1, pp. 131–140, 4 figs., 1932.

After stating that of recent years root rot (*Wojnowicia graminis*), foot rot (*Helminthosporium sativum*), and take-all (*Ophiobolus graminis*) [*R.A.M.*, vii, p. 370; x, p. 446] have become the most serious diseases of wheat in Western Australia, the author gives a brief popular account of the morphology and etiology of these diseases, and discusses at some length the measures for their control, which are similar for all three. Stubble burning, early and clean fallowing, the avoidance of 'dry working', rotation without pasturing, heavy dressings of superphosphate especially where there is much take-all, good drainage and good preparation of the seed-bed, and the use of good seed are the chief measures recommended.

LEUKEL (R. W.). **Factors affecting the development of loose smut in Barley and its control by dust fungicides.**—*U.S. Dept. of Agric. Tech. Bull.* 293, 19 pp., 1932.

This is a summarized account of experiments from 1920 to 1930 at the Arlington Experiment Farm at Rosslyn, Virginia, to test the efficacy of 27 [named] dust fungicides in the control of loose smut (*Ustilago nuda*) of barley. The results [which are presented in tabular form] indicated that none of the preparations was effective, except in the case of certain barley varieties, e.g., Wisconsin Pedigree No. 5 and Tennessee Winter No. 52, in which natural seed infection with the fungus appears to proceed on lines somewhat similar to those of seed infection with covered smut [*U. hordei*] and stripe disease [*Helminthosporium gramineum*]; in such varieties the more active dusts appeared to give control of loose smut, but in all the others full control was only given by the hot-water treatment.

Experiments to test the effect of environmental factors on the incidence and development of loose smut indicated that soil humidity close to the point of saturation at the time of sowing tended to inhibit somewhat the development and to favour the

control of the disease by dusts, the reverse being true for very dry soil containing just enough moisture to permit of the germination of the seed grain. Between these two extremes, however, variations in soil moisture did not appear to affect greatly either the development or the control of the smut. There was also evidence that a relatively high soil temperature before emergence of the seedlings favoured the development of the disease. The general indications were that the influence of environment is not limited to the period of germination and early growth of the host, but may extend over a considerable part of the latter's life.

SCOTT (R. C.). **Field experiments with manganese deficiency disease of Barley.**—*Journ. Dept. Agric. S. Australia*, xxxv, 7, pp. 771–780, 6 figs., 1 map, 1932.

The author gives a brief account of investigations and experiments since 1924 at Corny Point in the Yorke peninsula of South Australia, the results of which have definitely confirmed the fact that the failure in that region of cereal crops, and more particularly of barley, associated with the condition described by Samuel and Piper [*R.A.M.*, vii, p. 469], is due to deficiency of the soils in manganese. Considerable improvement in the stand and yield of barley in experimental plots and in fields affected with the trouble was obtained by applications of a mixed dressing, consisting of 3 cwt. manganese sulphate and 17 cwt. of superphosphate, at the rate of about 1 cwt. of the mixture per acre. Experimental results appeared to indicate that the amount of manganese sulphate could be profitably increased to 5 cwt. per ton of the mixture [cf. ibid., xi, p. 295]. Manganese dioxide, even when applied with sulphate of ammonia, was shown to be unable to supply the plants with sufficient soluble manganese. It was further shown that the mixture recommended must be drilled into the soil together with the seed grain, since, when the fertilizer was applied a few days prior to sowing, the crop practically failed, showing the usual symptoms of manganese deficiency.

LINDFORS (T.). **Vilka betningsmedel lämpa sig för vårsäden?** [Which disinfectants are suitable for spring seed-grain?]—*Landtmannen Tidskr. för Landtmän*, xv, 11, pp. 219–220, 1932.

Further experiments in Sweden on the control of loose smut of oats [*Ustilago avenae*] and stripe disease of barley [*Helminthosporium gramineum*: *R.A.M.*, x, pp. 510, 511] showed that sublimatformalin (liquid) and havretillantin dust are most effective against the former disease, germisan (0·25 per cent., 30 minutes' immersion), and uspulun, tutan, and abavit B dusts being less satisfactory. Uspulun dust, however, gave the highest increase of yield in all ten experiments (average 271 kg. grain per hect.), the corresponding figures for sublimatformalin, havretillantin, germisan, tutan, and abavit B being 138, 160, 116, 146, and 88 kg. per hect., respectively.

The best control of *H. gramineum* on barley was given by uspulun dust, germisan (0·25 per cent.), and uspulun-universal, tutan and abavit B being unsuitable for this purpose. The follow-

ing increases of yield were obtained by the treatments: germisan 242 kg. per hect., uspulun-universal 306, uspulun dust 115, tutan 76, and abavit B 350. All these preparations, with the exception of sublimatformalin, are also well adapted for the disinfection of spring wheat against *Fusarium*.

SLEUMER (H. O.). **Über Sexualität und Zytologie von Ustilago zeae (Beckm.) Unger.** [On the sexuality and cytology of *Ustilago zeae* (Beckm.) Unger.]—*Zeitschr. für Bot.*, xxv, 5, pp. 209–263, 1 pl., 33 fig., 1932.

Sporidial fusion in *Ustilago zeae*, the causal organism of maize smut [*R.A.M.*, xi, p. 363], was obtained in culture in sterile water rendered slightly alkaline with caustic potash at 17° C., as well as on a medium of 3 per cent. maltose and 3 per cent. glucose at 24°. From the fusion arise binuclear exploratory hyphae, the growth of which is checked in the so-called 'tangle fusion' (the term applied by Bauch to a similar process in *U. longissima*: *Arch. für Protistenkunde*, lxx, p. 417, 1930). All the combinations of monosporidial cultures causing infection were induced to fuse under appropriate conditions, whereas the strains forming entanglements failed to produce smut galls on maize. On the basis of preliminary observations the monosporidial cultures examined by the writer were placed in six distinct sexual groups.

At first the host tissue contains a binuclear mycelium, but shortly after infection uni- and quadrinuclear hyphae also develop; at a later stage all break up into predominantly uninuclear 'nest' cells, whether diploid or haploid could not be determined by cytological investigation. The sporidia developing from such cells are haploid, a fact that admits of several interpretations. Caryogamy, hitherto accepted as a stage in the development of the young spore, could not be detected with absolute certainty. However, at some point in the life-history of *U. zeae* nuclear fusion must occur, since an analysis of the progeny of a single spore showed that a uninuclear individual contains the elements of both the sexes involved in a cross [cf. *R.A.M.*, viii, p. 715].

LEONIAN (L. H.). **The pathogenicity and the variability of Fusarium moniliforme from Corn.**—*West Virginia Agric. Exper. Stat. Bull.* 248, 16 pp., 3 figs., 3 diags., 1932.

Out of 150 isolations made from Longfellow Flint maize in West Virginia in 1927, 110 proved to be *Fusarium moniliforme* [*Gibberella moniliformis*: *R.A.M.*, x, p. 238] and 20 *F. culmorum*, while the remainder consisted of various saprophytic forms. Of the 110 cultures of *G. moniliformis*, only 23 were pathogenic in inoculation experiments, carried out largely through wounds. Seedling wilt occurred only as a sequel to inoculation at the stem base, just below ground-level. Root inoculations resulted only in localized infections. Even when freshly germinated seedlings were kept on vigorously growing colonies of the fungus in Petri dishes and transplanted into the field after infection of most of the roots, they developed into normal plants. Little or no infection occurred at temperatures above 20° to 23° C. Even the most vigorous strains

of the fungus exhibited their pathogenicity in cycles, being able at one time to infect the host, while at another, under identical conditions, they failed to do so.

Most of the strains of *G. moniliformis* were very plastic and dissociated into many forms. One monospore isolation produced no less than 50 variants, differing among themselves not only in pathogenicity but also in morphological and physiological characters. Continuous monospore selection tended to fix even the most fluctuating types, but it is considered doubtful whether the purity and fixation thus obtained are of more than relative permanence. In the writer's opinion, each isolation possesses all the potentialities of the species, even though unable to express them all at the same time. Once this view is accepted, in contradistinction to that of the absolute rigidity and immutability of species, the dissociative phenomenon is no more unusual than variability, and the determination of any genus or species that has a firm foundation is not affected by it.

Late planting (June or July) in order to avoid cool, wet soil conditions appears to be the best way of avoiding seedling losses from *G. moniliformis*.

FRIEND (W. H.) & BACH (W. J.). **Storage experiments with Texas Citrus fruit.**—*Texas Agric. Exper. Stat. Bull.* 446, 40 pp., 4 figs., 1932.

A temperature of 45° F. was found to be more satisfactory for the storage of good quality, not over-ripe grapefruit in the Lower Rio Grande Valley than lower ones (31° to 32°), which caused a marked increase in the losses from pitting (pale or brown sunken spots on the rind) and scald (a physiological breakdown of the rind). Valencia oranges, on the other hand, kept well at 32° for fairly long periods (20 weeks). The amount of loss in storage was reduced to a minimum by 'curing' the fruit (i.e., keeping it at a temperature of 70° for ten days beforehand) and the use of waxed paper wraps. Little benefit was derived from the application to the fruit of various fungicidal washes, e.g., borax (which did, however, reduce the amount of scald), sodium bicarbonate, the Brogdex process [*R.A.M.*, x, p. 452], and the Slater hypochlorite process. These methods have, nevertheless, given satisfactory results in other lots of fruit infected by the blue and green moulds (*Penicillium italicum* and *P. digitatum*), which were of no importance in these experiments. Notes are given on stem-end rot (*Diplodia natalensis*) [ibid., x, p. 777 ; xi, p. 508], the incidence of which is negligible at 50° or below for three or four weeks or longer, and on various minor disorders.

HAAS (A. R. C.). **Some nutritional aspects in mottle-leaf and other physiological diseases of Citrus.**—*Hilgardia*, vi, 15, pp. 483–559, 35 figs., 1932.

Further studies in California on mottle leaf and allied physiological disorders of citrus [*R.A.M.*, viii, p. 717] showed that beryllium, like lithium and boron, is highly toxic in small concentrations (0·25 p.p.m. beryllium nitrate) to Eureka lemon cuttings in water

cultures, causing a type of mottling approaching variegation. At concentrations of 5 p.p.m. and above, Washington Navel and Valencia orange cuttings, as well as those of grapefruit, developed a severe root rot and defoliation.

Valencia orange leaves receiving an inadequate supply of nitrogen for a considerable period were observed to contract a dark-green and yellow mottling when applications of calcium and sodium nitrate in normal amounts were resumed. Chlorotic Valencia orange leaves sprayed with iron-containing solutions were found to show a dark-green spot where each drop of solution concentrates as the water evaporates. It is apparent from the fact that mature chlorotic leaves have the same composition as mottled ones that a close relation exists in certain cases between mottle leaf and chlorosis.

A deficiency of soluble calcium was found to exert an immense effect on the process of potassium absorption and hence on the health of the plants. Higher percentages of sodium and potassium and lower ones of calcium were found in mottled than in healthy lemon and orange leaves. The soluble calcium as a percentage of the soluble ash is roughly constant for healthy mature citrus leaves, and is much lower in mottled than in healthy foliage. On the other hand, the insoluble calcium as a percentage of the insoluble ash is roughly constant, irrespective of whether the leaves are mottled or healthy.

[Nattrass (R. M.).] **Citrus leaf gum spot.**—*Cyprus Agric. Journ.*, xxvii, 1, pp. 24–25, 1 fig., 1932.

Citrus leaves in Cyprus are subject to an abnormality that is frequently mistaken for an infectious disease. It takes the form of small, raised, dark-brown or black, irregular, smooth, hard pustules, caused by the impregnation of a small area of the surface cells with a hard, gum-like substance. The condition is thought to be induced by slight frost followed by bright sunshine, by certain spray materials, fumigation, or soil conditions and water relations.

Fawcett (H. S.) & Klotz (L. J.). **Diseases of the Date Palm, Phoenix dactylifera.**—*California Agric. Exper. Stat. Bull.* 522, 47 pp., 23 figs., 1932.

Notes are given on the symptoms, etiology, and control of a number of diseases affecting date palms (*Phoenix dactylifera*) in California. The species of *Diplodia* responsible for the decay of leaf stalks and offshoots of the Deglet Noor and other varieties in the Coachella Valley has now been determined as distinct from *D. natalensis* [*R.A.M.*, x, pp. 655, 657], and is considered to be identical with *Macrophoma phoenicum* Sacc., the name of which is changed to *D. phoenicum* (Sacc.) n. comb. The dark bi- (occasionally tri-)-cellular spores of the latter measure 22 to 24 by 10 to 12 μ; a conspicuous distinguishing feature is the formation of abundant dark, intercalary chlamydospores, which are absent in cultures of *D. natalensis* from citrus fruits in California and Florida.

The other diseases described include 'decline' [loc. cit.]; black scorch and terminal bud rot ('medjnoon' or 'fool' disease), caused by *Ceratostomella paradoxa* [ibid., xi, p. 509]; leaf spot or smut (*Graphiola phoenicis*); brown blotch, occurring in the Salt River Valley of Arizona as well as in California, and in North Africa, Italy, and France (Riviera), and associated with a species of (?) *Phoma* with abundant pycnidia, 120 to 140 μ in diameter, and hyaline pycnospores, 5 to 3 μ; 'dry bone' [ibid., x, p. 656]; brown spot (*Helminthosporium* sp. and *Alternaria* sp.) [ibid., x, p. 657]; calyx-end rot (*Aspergillus niger* and *Citromyces ramosus*); rot of wet-cured, packed dates due to *Catenularia fuliginea* [*Torula sacchari*]; and 'black nose' [ibid., x, pp. 656, 657].

Brief observations are also made on some diseases of dates not known to occur in California.

BRAIN (C. K.). **Report of the Director of Agriculture for the year 1930.**—*Rept. Secretary, Dept. of Agric. Southern Rhodesia for the year 1930*, pp. 4–14, 1931.

It is stated in this report that the numerous small coffee plantings made along the eastern border of Southern Rhodesia in the early days of the settlement were extensively destroyed by leaf disease (*Hemileia vastatrix*). Notwithstanding these discouraging results, the interest of planters in the coffee crop has been maintained, and during the last 15 years the Department has frequently been asked to supply seed. During the latter part of 1929, a survey of the area in question was made, at the request of the Mozambique authorities, by Mr. M. D. le Poer Trench of Kenya. As a result of this investigation it was strongly recommended that the Department of Agriculture should adopt a system of registration of plantations and make periodical inspections of all farms. All neglected or abandoned coffee trees should be destroyed, as constituting a menace to neighbouring plantations, and ultimately to the whole coffee-growing area.

WALLACE (G. B.). **Coffee bean disease. Relation of Nematospora gossypii to the disease.**—*Trop. Agriculture*, ix, 4, p. 127, 1932.

The author states that since the publication of his recent paper [*R.A.M.*, x, p. 453], *Nematospora gossypii* [ibid., v, p. 390] has been found to be associated with coffee bean disease in Tanganyika, in addition to *N. coryli*. This discovery widens the range of other plants which may be possible sources of infection of coffee. The disease extends into Uganda [ibid., xi, p. 353], and an unpublished communication indicates its frequent occurrence in Kenya. Both species of *Nematospora* appear to be equally destructive to coffee berries, and it is believed that they will be found to be equally widely distributed. In giving a brief description of the main cultural characters differentiating the two species, it is stated that the difference in spore width between them on coffee has been found to be greater than that described by previous authors, *N. gossypii* having spores 1·7 μ (1·6 to 1·9 μ) and *N. coryli* 2·8 μ (2·3 to 3·1 μ)

broad. Another striking difference is the abundance of yeast cells in *N. coryli* and their absence in *N. gossypii*.

EZEKIEL (W. N.) & TAUBENHAUS (J. J.). **Leaf temperatures of Cotton plants with Phymatotrichum root rot.**—*Science*, N.S., lxxv, 1945, pp. 391–392, 1932.

Leaves from Startex cotton plants wilted by *Phymatotrichum omnivorum* [*R.A.M.*, xi, p. 370] in Texas were found, by thermometer and thermocouple measurements, to be as much as 6·5° F. warmer than air temperature, whereas those from normal plants were usually cooler. In July and September, 1930, leaves from diseased cotton plants averaged about 3° F. warmer than those of healthy ones. There can be no doubt that the raised temperature of the leaves of root rot plants is due to the decrease in the water supply, which corresponds with the usual theory of the immediate cause of death in plants suffering from this disease.

MATHUR (R. N.). **Leaf-curl of Cotton in garden Zinnias in North India.**—*Nature*, cxxix, 3265, p. 797, 1932.

Recent investigations on a virus disease of garden zinnias at Dehra Dun suggest that it is identical with leaf curl of cotton in the Sudan and transmitted by the same vector (*Bemisia gossypiperda*) [*R.A.M.*, xi, p. 238]. Pending detailed results of the studies now in progress, it was thought that the presence of this disease and its insect carrier in India should be brought to the notice of those interested in the cotton industry of the country.

PETCH (T.). **British entomogenous fungi.**—*The Naturalist, 1932*, pp. 103–108, 133–136, 167–172, 1932.

Notes are given on a large number of British entomogenous fungi collected or examined by the writer [cf. *R.A.M.*, xi, p. 299]. There are stated to be now 52 known species of entomogenous fungi (excluding the Laboulbeniaceae) in the British Isles, compared with 26 two years ago.

PETCH (T.). **British species of Hirsutella.**—*The Naturalist, 1932*, pp. 45–49, 1932.

A revision of the British species of entomogenous fungi [see preceding abstract] showed that at least two formerly classified as *Isaria* should be referred to *Hirsutella*, viz., *I. eleutheratorum* Nees on beetles and *I. floccosa* Fr. on caterpillars, which should be known, respectively, as *H. eleutheratorum* (Nees) comb. nov. and *H. subulata* Petch (the name *H. floccosa* being already appropriated by Speare) [*R.A.M.*, viii, p. 380]. English diagnoses of both species are given.

PETCH (T.). **Gibellula.**—*Ann. Mycol.*, xxx, 3–4, pp. 386–393, 1 fig., 1932.

The examination of several hundred specimens of *Gibellula* on spiders from Ceylon, the West Indies, and Europe has convinced the writer that all those hitherto described belong to one species, the alleged specific variations being apparent in any reasonable series of specimens from a given locality. The earliest name for

this species is *Isaria aranearum*, and its correct one is considered to be *G. aranearum* (Schw.) Syd. A list of synonyms, including *G. elegans* [*R.A.M.*, viii, p. 380], is given. Finally, a description is given of *G. alata* n. sp. collected on spiders in Ceylon.

MORAN (T.), SMITH (E. C.), & TOMKINS (R. G.). **The inhibition of mould growth on meat by carbon dioxide.**—*Journ. Soc. Chem. Ind.*, li, 15, pp. 114T–116T, 1932.

Studies are in progress at the Low Temperature Research Station, Cambridge, on the growth in carbon dioxide of the following moulds responsible for meat spoilage [*R.A.M.*, iii, p. 52]: *Thamnidium chaetocladioides, T. elegans, Mucor mucedo, Cladosporium herbarum, Sporotrichum carnis* [ibid., ix, p. 199], *Penicillium expansum*, and *P. anormalium*.

In tests with 1 lb. pieces of lean beef inoculated with *T. chaetocladioides* at 1° C. in gas-tight jars filled with air containing carbon dioxide in concentrations of 0 to 100 per cent., it was found that a concentration of 10 per cent. retards growth of the mould in the early stages by one-half, while at 20 per cent. its development is, for all practical purposes, completely inhibited. That this effect is specifically due to the carbon dioxide and not to diminution of the partial pressure of oxygen was shown by comparative tests in which nitrogen up to 20 per cent. was added to jars of infected meat. After 4½ days' storage the meat in the nitrogen series was, if anything, more heavily infected by *T. chaetocladioides* than that without nitrogen. Storage in carbon dioxide up to 30 per cent. was found to impair neither the appearance nor the palatability of the meat. In the case of beef fat the inhibition of growth of *T. chaetocladioides* stored in carbon dioxide (up to 20 per cent.) was also clearly evident, though less marked than on the lean surfaces.

In nutrient agar cultures kept at 0° to 20° C. in a saturated atmosphere, the growth of *T. chaetocladioides, M. mucedo*, and *C. herbarum* in the presence of 20 per cent. carbon dioxide ranged from one-half to one-fifth of that in the air, the inhibition being more pronounced at the lower temperatures.

Two outstanding problems are stated to require solution before these results can be applied in practice to the transport and storage of meat, namely, (1) the behaviour of yeasts and bacteria in concentrations of carbon dioxide of the order under discussion; and (2) the feasibility of maintaining the necessary atmosphere in the ship's hold or the commercial cold store.

LAXA (O.). **O nové ušlechtilé sýrařské plísni.** [Note on a new, improved mould in the preparation of cheese.]—*Bull. Czecho-Slovak. Acad. of Agric.*, viii, 4, pp. 383–384, 1932. [French translation.]

The author states that the study of the fungi associated with the maturing process of Nalžovy cheese showed that the latter owed its distinctive characters to a species of *Penicillium* morphologically similar to *P. album* but differing from it in its cultural and biochemical characters, and which he names *P. nalgiovensis*. This fungus is abundantly present in the caves where the cheese is matured, but has not been found to occur elsewhere in the locality;

it is believed that it was introduced into the country in 1885, together with the cheese manufacturing industry. *P. album* is also concerned, but to a lesser degree, in the maturation process of the local cheese, which partakes of the nature of Camembert.

POLLACCI (G.). **Sulla posizione sistematica dei miceti delle tigne (Rivendicazione).** [On the systematic position of the fungi causing ringworm. (A vindication).]—Reprinted from *Atti Ist. Bot. R. Univ. di Pavia,* Ser. IV, iii, 4 pp., 1931. [Latin summary.]

In this paper the author brings forward the full evidence upon which he bases his claim that Nannizzi was the first definitely to place the Dermatomycetes among the Gymnoascaceae [*R.A.M.*, v, p. 553; x, p. 664]. He points out that as early as in 1923, in a paper which he communicated to the congress of the Società Dermosifilopatica Italiana held at Florence, he stated that his collaborator Nannizzi had succeeded in cultivating various species of *Trichophyton* and had obtained organs analogous to the peridia of the Gymnoascaceae, and differing from them only in containing pycnospores. Nannizzi further showed that *Ctenomyces serratus* as well as certain species of *Arachniotus, Gymnoascus,* and *Myxotrichum* when grown on the usual media gave rise to colonies identical with those of various Dermatomycetes grown in the same conditions. In 1927, Nannizzi further showed that he had obtained not only peridia and pycnospores but also asci and ascospores in cultures of *Achorion gypseum* on moulds mixed with pieces of old leather and feathers [ibid., vii, p. 169].

The statement by Langeron and Milochevitch [ibid., x, p. 242] that Nannizzi did not use pure cultures is completely refuted. Both in the earlier paper (1926) and in the study on *A. gypseum,* pure cultures on sterilized media were used except where explicitly stated, and the published photograph of *T. denticolatum* shows that the drawings were not over-schematized.

Nannizzi's statement on p. 125 of his first paper that the ringworm fungi should definitely be placed amongst the Gymnoascaceae is considered to have an adequate basis in the facts established by him and has merely been confirmed by the work of Langeron and Milochevitch.

VÁMOS (L.). **Pilze und Wasserstoffionenkonzentration.** [Fungi and hydrogen-ion concentration.]—*Dermatol. Zeitschr.*, lxiii, 5, pp. 345–350, 2 graphs, 1932.

The writer's experiments showed that *Trichophyton gypseum, T. rosaceum, T. violaceum, Microsporon audouini,* and *Epidermophyton inguinale* [*E. floccosum*: *R.A.M.*, xi, pp. 44, 458] grow on a solid medium between P_H 5·0 and 8·0. Cultures of *M. audouini* and *E. floccosum* grew best at P_H 6·50 to 7·20, whereas the other dermatophytes throve equally well throughout the growth range. The scalp of adults has a more acid reaction (P_H 4·50 to 5·60) than in childhood (6·16 to 6·50). Hence, one of the causes of the spontaneous healing of microsporosis after the age of puberty may be the shifting of the P_H value of the scalp in the acid direction.

KAMBAYASHI (T.). **Eine botanische Untersuchung des Microsporon furfur Robin.** [A botanical investigation of *Microsporon furfur* Robin.]—*Bot. Mag.*, Tokyo, xlvi, 544, pp. 232–238, 3 pl., 1932.

Microsporon [*Malassezia*] *furfur*, the causal organism of pityriasis versicolor [*R.A.M.*, x, p. 459; xi, p. 43], grown on Sabouraud's glucose-peptone agar, produces yellowish-white, grey-tinged colonies. The hyphae are irregularly curved, tapering towards the apex, and measure 2·4 to 3·5 μ in breadth; they branch profusely in older cultures, forming conidiophores from which are abstricted, singly or in chains, hyaline, round or elongated-oval conidia, 3 to 6 by 4 μ; these bodies may also arise direct from the hyphae. Pending further studies on the systematic position of *M. furfur*, the present classification of which is not accepted by the writer, the fungus should be regarded as standing very close to *Sporotrichum*, though it cannot yet be definitely transferred to this genus.

CATANEI (A.). **Résultats de l'étude expérimentale de Trichophyton langeroni S. Milochevitch 1931.** [Results of the experimental study of *Trichophyton langeroni* S. Milochevitch 1931.]—*Comptes rendus Soc. de Biol.*, cix, 13, pp. 1160–1161, 1932.

Trichophyton langeroni, recently isolated by Milochevitch from a ringworm of the scalp of a child in Belgrade, Jugo-Slavia [*R.A.M.*, xi, p. 181], was successfully inoculated by the writer into four guinea-pigs, two Algerian monkeys (*Macacus inuus*), and two calves. The upper part of the hairs infected by the fungus contains a small number of septate hyphae, 4 μ wide; the middle portion is chiefly occupied by endothrix hyphae of the same type, which further occur in still larger numbers at the base. The infected hair is surrounded by a loose network of ectothrix elements, rounded or ovoid, the former shape predominating in the monkey; these bodies measure 3 to 6·5 μ (up to 8 μ in the ovoid forms).

ASCHIERI (EUGENIA). **Ricerche sistematiche e fisiologiche su un Hyalopus causa di onicomicosi.** [Systematic and physiological researches on a *Hyalopus* causing onychomycosis.]—Reprinted from *Atti Ist. Bot. R. Univ. di Pavia*, Ser. IV, iii, 19 pp., 8 figs., 1931. [Latin summary.]

From a lesion on the finger-nail of a female patient a fungus was isolated which Vuillemin, by reason of the peculiar curvature of the 1- or 2-septate conidia, identified as an *Allantospora* and named *A. onychophila*, but which the author regards as a *Hyalopus* and renames *H. onychophilus* (Vuillemin) Aschieri, because of the presence of heads at the hyphal extremities and of the manner of formation of the conidia, which also were not constantly elongated and curved. The sterile hyphae were hyaline, septate, and up to 4·5 μ in diameter; the conidiophores measured 1·5 to 2·5 μ in diameter, were simple or branched, sometimes septate, and terminated in heads formed by elongated or oval, sometimes curved conidia 4 to 18 μ in length. Intercalary chlamydospores were formed in chains of two or three or more. The optimum tempera-

ture for growth was 25° C. Prolonged exposure to ultra-violet rays retarded growth and altered the shape of the conidia, which tended to shorten and become globose.

AGOSTINI (ANGELA). **Coniosporium onychophilum n. sp. causa di onicomicosi.** [*Coniosporium onychophilum* n. sp. a cause of onychomycosis.]—Reprinted from *Atti Ist. Bot. R. Univ. di Pavia*, Ser. IV, iii, 8 pp., 5 figs., 1931. [Latin summary.]

In this paper, a preliminary summary of which has already been noticed from another source [*R.A.M.*, xi, p. 45], the author briefly describes the morphological and physiological characters of the fungus isolated from the finger- and toe-nails of a male patient in Italy, and named *Coniosporium onychophilum* n. sp.

On Pollacci's medium, glucose, potato, and carrot the organism formed flocculent, downy, extensive colonies which were white at first, but later turned pink on the surface and hazel underneath. The mycelium consisted of hyphae 2 to 2·5 μ and others 6 to 7·5 μ in diameter; the former were sparsely branched, irregularly septate, and occasionally yellowish-brown, and the latter regularly septate and always showing the brown coloration.

Conidial production, which was exceedingly rapid and profuse, took place with the formation of continuous, usually hyaline, simple or occasionally branched conidiophores (generally on the thicker hyphae), measuring 4 to 38 by 4 to 6 μ. The conidia, which were borne at the apex, were hyaline, but quickly turned brown, and were sessile or almost so. They were lentiform, measured 8 to 12 by 4 to 5 μ, had a fuliginous or olivaceous epispore, and were surrounded by a light rim. Ellipsoidal conidia measuring 10 to 12 by 5 to 7 μ were also observed, as well as oval, curved, reniform, or claviform endoconidia up to 20 μ long. A Latin diagnosis is given.

AGOSTINI (ANGELA). **Ricerche biologiche sull'Acrostalagmus cinnabarinus Corda.** [Biological researches on *Acrostalagmus cinnabarinus* Corda.]—Reprinted from *Atti Ist. Bot. Univ. di Pavia*, Ser. IV, iii, 8 pp., 1931. [Latin summary.]

A morphological and biological account is given of *Acrostalagmus cinnabarinus* isolated from the mammary gland of a mare in Africa and from a trichophytosis of the scalp of a male patient in Italy [*R.A.M.*, xi, p. 458].

On carrot and on wheat grain the fungus grew well, and retained its known morphological characters. On Pollacci's and Sabouraud's media, glucose broth, potato, milk, and hair it showed in addition to the morphological characters described by Corda, a thin, hyaline mycelium frequently with racket-shaped hyphae arranged in synnemata. In Raulin's liquid it grew with difficulty, showing morphological characters different from those developed on other media, the hyphae mostly measuring 2 to 3 μ in diameter, and being very regular, unbranched, and often arranged in synnemata: verticillate conidiophores were very seldom observed, and some of the spores were round, measuring 2 to 3 μ in diameter. On blood agar the mycelium was usually hyaline or faintly yellowish, some hyphae measuring 1·5 to 2·5 μ, and others, more or less regularly

septate, 6 to 7 μ, in diameter. The racket-shaped tips reach 15 μ in breadth. Most of the conidiophores showed only two verticils, but sometimes there was only one or even none, the conidiophore having a single cluster of spores attached to its tip. The optimum temperature for growth was between 20° and 25° C.; the fungus coagulated milk but did not break down glucose, maltose, or galactose.

Tests of pathogenicity on laboratory animals gave negative results. A bibliography of 13 titles is appended.

MAFFEI (L.). **Micosi causata da una varietà di Halobyssus moniliformis Zukal.** [A mycosis caused by a variety of *Halobyssus moniliformis* Zukal.]—Reprinted from *Atti Ist. Bot. R. Univ. di Pavia*, Ser. IV, iii, 10 pp., 10 figs., 1931. [Latin summary.]

From a ten-year-old lesion on the wrist of a male patient a fungus was isolated which in culture produced hyaline, branched, septate hyphae measuring 1 to 5 μ in diameter. Chains of chlamydospores are formed at the apex or in other parts of the hyphae, the chains at the apex having a very characteristic clavate appearance. It was nearly a year before the author observed these chains to break up. The chlamydospores ranged from 4 to 14 μ (average 10 to 12 μ) in diameter, and were round, spherical, and provided with a tough membrane; some were smooth, others verrucose or with a granular membrane.

The author considers that the fungus is a variety of *Halobyssus moniliformis* Zukal, which he names *H. moniliformis* Zukal var. *parasiticus* Maffei. It has not previously been recorded on man. A diagnosis is given in Latin.

DIDDENS (HARMANNA A.). **Untersuchungen über den Flachsbrand (verursacht durch Pythium megalacanthum de Bary).** [Investigations on Flax scorch (caused by *Pythium megalacanthum* de Bary).]—*Phytopath. Zeitschr.*, iv, 3, pp. 291–313, 5 figs., 1932.

This is a condensed account of the writer's studies on flax 'scorch' (*Pythium megalacanthum*) in Holland, the full paper on which has already been noticed [*R.A.M.*, x, p. 731].

ROLET (A.). **La rouille orangée des Rosiers.** [The orange rust of Rose trees.]—*La Vie Agric. et Rurale*, xxi, 14, pp. 223–224, 1932.

A popular note is given on the life-history, symptoms, and control of orange rust of roses (*Phragmidium subcorticium* or *P. mucronatum*) [*R.A.M.*, x, p. 524] in the south of France, where the climbing varieties, Noisette and Rugueux du Japon, and those used for scent, Brünner and Rosier de mai, are stated to be particularly susceptible, while tea roses appear to be highly resistant. Sanitary measures, disinfection of frames and soil, and regular applications of a standard fungicide are recommended.

MCWHORTER (F. P.). **Narcissus 'gray disease' is a transmissible mosaic.**—*Florists' Exchange*, lxxix, 14, p. 11, 2 figs., 1932.

In tests carried out during 1929–30 at the Oregon Agricultural

Experiment Station, the percentage of transmission of narcissus mosaic or 'gray disease' [*R.A.M.*, x, p. 162] by the introduction of diseased juice into scratched healthy leaves of the Talma and Sir Watkin varieties ranged from 35 to 63. Further tests were made in 1931 under specially controlled conditions on 'sister-bulb' plants, obtained as follows: (1) when the lots intended for inoculation were harvested, each bulb-clump was bagged separately; (2) at planting time the two largest bulbs from each clump were so planted that one could be inoculated and the other serve as an accurate control. These were planted in sets of ten in bed rows, and after the inoculation of the one set of sister-bulb plants, both these and the controls were left in place for percentage readings in 1932, when the amount of transmission shown by the inoculated plants was in some cases 20 per cent. against none in the controls.

In most parts of the United States the narcissus is practically free from aphids, and it therefore appeared probable that the disease might be spread through root contact, especially of injured roots, as well as by the (still unknown) insect carrier. Confirmation of this has now been obtained. Golden Spur bulbs of diseased and healthy stocks were planted in 1930 so that infected and sound plants were interspersed in the rows. In 1931 the mosaic plants were lifted, and in one of the test rows this roguing process exposed 62 adjoining plants to mosaic transmission by mutilating the roots. Of these 62 plants, 16 (25 per cent.) were found to have developed mosaic in 1932. Pending further experiments on a large scale, the writer recommends the removal not only of the diseased plants but also of the two adjoining.

CHESTER (K. S.). **A comparative study of three Phytophthora diseases of Lilac and of their pathogens.**—*Journ. Arnold Arboretum*, xiii, 2, pp. 232–268, 2 pl., 1 graph, 1932.

A detailed account is given of the author's comparative study of *Phytophthora syringae* [*R.A.M.*, ix, p. 626; x, p. 355], *P. cactorum* [ibid., ix, p. 390], and a strain herein designated Type A, all parasitic on lilac, the first-named from Europe and the others in the United States.

With regard to rate and type of growth on a number of standard media, *P. syringae* was found to differ markedly from the other two strains, which were in general rather similar. *P. syringae* was also distinguished from the other two forms by a more scanty production of oogonia, which were absent on various media, e.g., steamed bean pods and Lima bean agar, on which they were abundantly produced by *P. cactorum* and Type A. *P. cactorum* formed oogonia in unusually large numbers on many of the media used, while Type A was intermediate between the other two in this respect. Except by the sudden removal of the food supply (following Klebs's technique), sporangial production could scarcely be induced in any of the strains and appeared to be totally absent under normal conditions in *P. syringae*.

None of the organisms made appreciable growth at 29°, while at 27° only a few cultures of Type A and *P. cactorum* developed slightly. Extensive growth was made by the two last-named at 25°, which appears to be near their optimum, but *P. syringae*

failed to develop at this temperature, its maximum being 23° and its optimum about 20°. Corresponding differences were manifested in regard to hydrogen-ion concentration, the growth range for *P. syringae* being P_H 3·5 to 7·5, for *P. cactorum* P_H 3·0 to 10·0, and for Type A 3·0 to 9·5.

Morphological observations revealed some minor differences between the mycelial habit of the three species, the branching in *P. syringae* being monopodial, that of *P. cactorum* and Type A irregularly monopodial or sometimes approaching dichotomy; in the last-named the hyphae are much more profusely branched on maize meal agar than in the other species. The sporangia, which measured 20 to 40 by 15 to 30 μ in all three fungi, differed markedly as regards the type of papilla, which was very prominent in *P. cactorum*, in contrast to the flattened, inconspicuous papillae of the other two. This striking and constant character was found to be the most useful criterion for the differentiation of the otherwise similar *P. cactorum* and Type A. The mean and mode dimensions of the oospores of *P. syringae* were $31{\cdot}10 \pm 11$ and $32{\cdot}04\ \mu$ compared with $22{\cdot}94 \pm 0{\cdot}06$ and $21{\cdot}36\ \mu$ for *P. cactorum* and $24{\cdot}97 \pm 0{\cdot}09$ and $24{\cdot}92\ \mu$ for Type A. In all three organisms the antheridia are mainly paragynous and the oogonia broadly clavate to subspherical or spherical and usually terminal. The oospores have a thick triple wall, which in Type A is sometimes surrounded by a granular aura. Various types of abortive reproductive structures occur in all the three strains, but their development is so erratic that they cannot be used for specific differentiation.

Discussing the taxonomy of the lilac parasites on the basis of these physiological and morphological studies, the writer concludes that Type A resembles *P. cactorum* more closely than any other species of *Phytophthora*. However, on account of its different form of papilla and other less conspicuous variations, it is constituted a new variety, *P. cactorum* var. *applanata*.

P. syringae was found to be most active as a parasite on the woody tissues during the dormant period, while *P. cactorum* and its variety *applanata* were most prevalent on the succulent sprouts in the spring. These observations are consistent with the temperature relations of the fungi given above. Infection by all these organisms is favoured by a high degree of humidity, as well as by the method of cultivation known as 'heeling in', in which the buds are brought into close contact with the soil. Under ordinary American conditions there is probably little likelihood of destructive epidemics of the *Phytophthora* diseases, but control measures may well be necessary, as against *P. syringae* in Europe. These should be based on suitable cultural methods, supplemented by spraying with 4–5–50 Bordeaux mixture, which completely inhibited zoospore germination in laboratory tests.

POEVERLEIN (H.). **Die Gesamtverbreitung der Uropyxis sanguinea in Europa. (Nachtrag.)** [The distribution of *Uropyxis sanguinea* throughout Europe. (Supplement).]—*Ann. Mycol.*, xxx, 3–4, pp. 402–404, 1932.

Since the publication of the writer's previous survey of the distribution of *Uropyxis sanguinea* [*Puccinia mirabilissima*] on

barberry [*Berberis aquifolium*] in Europe [*R.A.M.*, x, pp. 316, 776], the rust has been found in a number of new localities [which are listed] in Germany, England, France, Switzerland, and Czecho-Slovakia.

SWIFT (MARJORIE E.). **Phoma conidiogena on Box.**—*Mycologia*, xxiv, 2, pp. 199–206, 1 pl., 2 figs., 1932.

A brief morphological and cultural account is given of a strain of *Phoma conidiogena* [*R.A.M.*, xi, p. 374] which was isolated late in the summer of 1930 from dead leaf tips and blighted twigs of *Buxus sempervirens* var. *angustifolia* in the New York Botanical Garden, this being, so far as the author is aware, the first record of this fungus on this host. All the indications are that the organism is a weak parasite, apparently only capable of attacking the host tissues when they are weakened by other causes. Single spore cultures produced spores both of the *Phoma* and *Alternaria* types which, with the exception of one mutant, were also formed in all subsequent monospore subcultures from either type. The mutant appeared after nine months of frequent transferring in the form of an almost sterile sector with abundant white, flocculent aerial hyphae, contrasting sharply with the normal greenish-brown growth; subcultures from this sector developed very few pycnidia on corn meal agar as compared with the original strain; single spore cultures from these pycnidia gave a vegetative growth very similar to that of the original strain, but no spores of the *Alternaria* type were formed by the mutant cultures on any of the media tested.

POPP (M.). **Duwock und Giftpilz.** [Horsetail and poison fungus.]—*Oldenburg. Landw.-Bl.*, xxv, p. 400, 1931. [Abs. in *Biedermann's Zentrabl.*, Ab. A, lxi, 4, p. 281, 1932.]

Horsetail [*Equisetum*] in an enclosed plot in Oldenburg was found to be attacked and killed by *Fusarium roseum* [the conidial stage of *Gibberella saubinetii*].

KÜSTER (E.). **Spritzmittel und Spritzmethoden im amerikanischen Obstbau.** [Spraying materials and spraying methods in American fruit growing.]—*Obst- und Gemüsebau*, lxxviii, 4, pp. 50–52, 1932.

An account is given of the writer's observations on the spraying methods and materials used in New York State against apple pests and diseases, with special reference to scab [*Venturia inaequalis*].

KOTTE (W.). **Spritzmittelschäden im Obstbau.** [Spraying injuries in fruit growing.]—*Gartenbauwissensch.*, v, p. 525, 1931. [Abs. in *Fortschr. der Landw.*, vii, 11, p. 306, 1932.]

The writer's observations and experiments in Baden showed that arsenical sprays are the most liable to cause injury to vines, whereas in orchards copper-containing preparations are responsible for the bulk of the damage, arsenic and lime-sulphur being relatively innocuous [cf. *R.A.M.*, xi, p. 185]. The various types of injury on leaves and fruit are described. The extent of the damage depends

on a number of factors, such as the composition of the spray, the kind and variety of the fruit, climate and weather conditions, the physiological condition of the tree, and the health of the foliage. In connexion with these five points the relative merits of various commercial preparations are discussed. As a result of his investigations the writer recommends the employment of lime-sulphur in intensive fruit growing, the use of copper sprays being advisable only where this industry is of secondary importance.

JØRSTAD (I.). **Nyere resultater av forsøksprøitning mot soppsykdommer på frukttraeer.** [Recent results of experimental spraying against fungous diseases of fruit trees.]—Reprinted from *Havedyrkningens Venners Medlemsskr., 1932*, 2, 7 pp., 1932.

The results [which are tabulated and discussed] of recent experiments in the control of some fungous diseases of fruit trees in Norway showed that pear scab [*Venturia pirina*] is amenable to control by three applications of 1 per cent. Bordeaux mixture [*R.A.M.*, viii, p. 584], immediately before and after flowering and when the fruit is beginning to form, the two former being the most important. Pear canker [*Nectria galligena*: ibid., vii, p. 677; x, p. 253] on the highly susceptible Keiserinne [Empress] variety was well controlled by a dormant application of carbolineum and 2 per cent. Bordeaux mixture at the unfolding of the leaves (or 3 per cent. copper sulphate just before this time).

Good control of apple scab [*V. inaequalis*] was obtained by one application of 1 per cent. Bordeaux mixture, followed by two of lime-sulphur and two of Burgundy mixture (0·5 per cent.) or by three of lime-sulphur and one of Burgundy mixture, or by three or four of lime-sulphur [ibid., xi, p. 49]. Where the preliminary application of Bordeaux mixture was omitted, Burgundy mixture was more effective than lime-sulphur for the later sprays, but the proportion of scab-free fruit was much lower than where the complete schedule was followed. In one series of tests two applications of Bordeaux mixture were more efficacious than three of lime-sulphur.

Two applications of a fungicide should be given against shot hole (*Clasterosporium carpophilum*) [ibid., xi, p. 803] and *Monilia* [*Sclerotinia cinerea*: ibid., iii, p. 282; v, p. 559] on cherries, viz., either 1 per cent. caustic soda with green soap before the emergence of the leaves and 0·5 per cent. Bordeaux mixture after flowering, or 1 per cent. Bordeaux mixture between the unfolding of the leaves and flowering and 0·5 per cent. of the same after flowering.

CUNNINGHAM (G. H.). **Orchard sprays in New Zealand. I. The sulphur series.**—*New Zealand Journ. of Agric.*, xliv, 3, pp. 177–186, 4 figs., 1932.

In this paper, the first of a series dealing with fungicidal and insecticidal preparations employed in the commercial control of parasitic diseases of orchard trees in New Zealand, the author discusses in some detail the chemical and physical properties of the available types of sulphur either in dust or colloidal form, the

methods for the assessment of their respective value, and their lethal action on the parasites.

KOHL (E. J.). **Investigations on Apple blotch.**—*Phytopath.*, xxii, 4, pp. 349–369, 2 figs., 7 graphs, 1932.

Full particulars are given of the writer's extensive investigations in Indiana on the factors governing the production of viable spores of the apple blotch fungus (*Phyllosticta solitaria*) [*R.A.M.*, iv, p. 742 ; x, p. 194] and on the methods of infection and subsequent development of the disease.

At La Fayette and Mitchell, pycnospores were mature in overwintered cankers in late April, while in young cankers, developing in May as a result of infection during the previous season, the spores were mature in July. Fertile pycnidia were formed on maize meal agar in about 21 days on thalli containing the original tissue planting, but not in subcultures. Fructification occurred in profusion between 19° and 21° C. Under natural conditions the interval elapsing between the morphological and physiological maturity of the spores was about six weeks. Spores germinated in water formed hyaline germ-tubes only, whereas on leaves olivaceous-brown germ-tubes and appressoria (10 by 6 μ) were produced.

Young Duchess apple trees were successfully inoculated in the leaf petioles by spores from natural sources and cultures. In the petiole the fungus does not penetrate beyond the collenchyma, along which it passes back through the abscission layer to the bark of the twig, where overwintering occurs in the cortical collenchyma. The time of natural infection in the localities under observation was shown, by experiments with potted trees from 1925 to 1928, to extend from late April or early May till about the middle of July. Very early infection occurred when protracted wet weather coincided with the time of physiological maturity of the inoculum (generally about the time of petal fall). The shortest interval between petal fall and infection was one day (La Fayette in 1927) and the longest 74 days (Mitchell in 1928). The incubation period was found to range from 18 to 24 days. Cankers seldom form in the season of infection. The development in the process of canker formation of abnormal parenchymatous tissue below the phellem took place not only from the cambium but also to a considerable extent in the secondary phloem. In 1927 at Vincennes, Indiana, petiolar infection was traced to cankers found on 1925 wood, and in 1928 a small amount of infection was found to have originated in cankers on 1927 wood, so that the infection cycle in the former season was two years and in the latter one year.

DUNEGAN (J. C.). **The bacterial spot disease of the Peach and other stone fruits.**—*U.S. Dept. of Agric. Tech. Bull.* 273, 53 pp., 7 pl. (1 col.), 2 figs., 1 map, 1932.

In the first stages of its attack on peach *Bacterium pruni* is intercellular, but later the cell walls are ruptured and bacteria are present in the remnants of the cells. Only the parenchymatous tissue is attacked in leaf and fruit spots, but in twig lesions the phloem is occasionally invaded. The result is the formation of a

cavity isolated from the healthy fruit and twig tissues by a layer of wound cork.

Experimental evidence was obtained that *Bact. pruni* decomposes peptone and beef extract, with the production of hydroxyl ions. When twelve carbohydrates were tested with a standard synthetic medium *Bact. pruni* fermented them without producing gas, an acid reaction being provoked in the medium. The organism grew vigorously on monosaccharides, but very poorly on disaccharides and trisaccharides.

Cultures on beef extract agar kept at 24° to 26° C. were still viable after 90 days, and on one occasion growth was obtained from a culture 146 days old.

Evidence was obtained that initial outbreaks of the disease were correlated with the presence of overwintered twig cankers, from a number of which the organism was isolated [*R.A.M.*, x, p. 225]; there was no indication that it overwinters on fallen leaves. From field observations, spread apparently takes place through the agency of wind, rain, and dew. An orchard survey showed that in one block of 102 trees the number of infected trees increased from 20 on 18th May to 49 on 30th June and 86 on 13th July; on each of the two later dates more than half the number of the infected trees were adjacent to trees previously infected. Fruit of susceptible peach varieties is liable to infection at any time after the calyces have fallen; young, succulent twigs are susceptible, but infection cannot occur when the tissues have matured.

Spraying with zinc sulphate and lime (4–4–50) [ibid., xi, p. 521], while not completely eliminating the disease, reduces the amount of defoliation and increases the percentage of saleable fruit.

A bibliography of 49 titles is appended.

WORMALD (H.). **Supplementary note on Plum bacterial canker.** —*Journ. Pomol. and Hort. Science*, x, 1, p. 64, 1932.

The author's attention was drawn to two papers by Bedford and Pickering in which a description was given of a canker in plum trees seen at Harpenden and Woburn during 1895 to 1898 and reported from various sources to be caused by *Nectria ditissima* [*R.A.M.*, vii, p. 676], *Micrococcus dendroporthes*, and *Eutypella prunastri* [ibid., iii, p. 405], respectively. From the description of the symptoms he considers that most probably the disease was identical with that recently described under the name of bacterial canker of the plum as caused by *Pseudomonas mors-prunorum* [ibid., xi, p. 379].

STEVENS (N.). **Market diseases of Strawberries from the south-eastern States, 1926 to 1930.**—*U.S. Dept. of Agric. Circ.* 219, 4 pp., 1932.

An analysis of the data furnished by the inspection of 9,543 carloads (or 13 per cent. of the total carload movement) of strawberries at terminal markets in the United States during the five-year period to 31st December, 1930, showed that over 40 per cent. of the cars inspected had non-rotted fruit, as compared with 32 per cent. during the seven-year period to 1925 [*R.A.M.*, vi, p. 240],

when 5·5 per cent. of the total carload movement was inspected. From 1926 to 1930, inclusive, the average amount of rotted fruit per car ranged from 2·5 to 9 per cent., while during the earlier period the corresponding figures were 3·8 to 15 per cent. During the former period the average amount of decay due to *Rhizopus nigricans* amounted to 1·54 per cent. and that due to [unspecified] brown rots to 2·34 per cent., the corresponding figures for the earlier period being 4·63 and 3·6 per cent. This marked improvement is considered to have resulted mainly from better methods of refrigeration and handling.

MAGEE (C. J.). **Leaf-fall of Bananas. Experiment indicates control by manuring.**—*Agric. Gaz. New South Wales*, xliii, 4, pp. 319–321, 1 plan, 1932.

The author states that since 1930 a diseased condition has appeared in banana plantations set out on old pasture and sugar-cane land in the Tweed valley of New South Wales, characterized by a premature withering and dying of the banana leaves in acropetal succession. The first symptom of the disease is the development in the laminae, midrib, and petioles of water soaked, somewhat oily areas which often attain considerable size, and may extend from the mid-rib to the margin; later these spots become brown and dry. Isolations from the lesions yielded a Gram-negative, gas-forming bacterium, the pathogenicity of which was, however, disproved in inoculation experiments, and the opinion was formed that the condition was possibly a physiological trouble due to exhaustion of the soil. This view was substantiated by experiments, in which the disease was controlled by applications to each banana plant of 4½ lb. of a mixture containing equal parts of superphosphate, muriate of potash, and sulphate of ammonia.

SMITH (F. E. V.). **Panama disease. The use of chemicals for killing Bananas in the treatment of Panama disease.**—*Trop. Agriculture*, ix, 3, pp. 83–86, 1932.

This is an expanded version of the author's account of the method devised by him for killing *in situ* the roots of banana trees affected with Panama disease (*Fusarium cubense*) [*F. oxysporum*: *R.A.M.*, x, p. 533]. In addition to the information already noticed, it is stated that light gas oils, delco oil, and kerosenes of various types were as effective as heavy gas oil in the killing of the banana roots, but they are not recommended for general use because of their higher cost. Experiments to test the effect of the oil treatment on subsequent plant growth showed that banana suckers, grapefruit seedlings, sweet potato cuttings, and cabbage plants planted from two to six months after the application of the oil all grew well, and the bananas fruited normally. It was also shown in tests with naturally infected banana material that the oil inhibits to a limited extent the growth of *F. cubense*, and very definitely reduces the amount of spore formation, while its destructive effect upon the infected banana tissues materially reduces the period of maximum activity of the fungus. Experience so far has shown that early treatment of the disease (as soon as the first symptoms appear in the leaves) tends

to reduce the rate of spread of the disease, probably because at that stage the fungus has not penetrated a great distance into the corm and pseudo-stem, and therefore all the infected area in the plant is rapidly killed by the oil.

LINFORD (M. B.). **Transmission of the Pineapple yellow-spot virus by Thrips tabaci.**—*Phytopath.*, xxii, 4, pp. 301–324, 7 figs., 1 diag., 1932.

This is the full report of the writer's experiments on the transmission of the pineapple yellow spot virus by *Thrips tabaci* in Hawaii, an abstract of which has already been noticed [*R.A.M.*, xi, p. 191]. The following points were not previously mentioned. The minimum incubation period in the weed host of the virus, *Emilia sagittata* [*E. flammea*], is about 8 days and the mean about 15, the corresponding periods for pineapple being 7 and 12, respectively. In addition to pineapple and *E. flammea*, *T. tabaci* transmits the virus to, and can recover it from, several other plants, e.g., *Senecio hieracifolia*, *Bidens pilosa*, and *Sonchus oleraceus*, on which further studies are planned.

MARTIN (H.). Научные основы дела защиты растений. [The scientific principles of plant protection.]—Russian translation with addenda by PETROFF (A. D.), TROITZKY (N. N.), FILIPIEFF (I. N.), & JACZEWSKI (A. A.), 359 pp., 2 figs., Гос. Научно-Техническое Издат. Ленхимсектор. [State Scientific-Technical Publishing Office, Lenchimsector], Leningrad, 1931. [Received June, 1932.]

This is a literal translation, with additions, into Russian of Martin's recent book on 'The Scientific Principles of Plant Protection' [*R.A.M.*, viii, p. 115]. The fairly extensive additional matter [in the form of interpolations in the text, marked by brackets] by the individual translators, each from his specialized knowledge of different branches of the subject, consist of observations and notes of interest from the Russian point of view. From among their number particular mention may be made of Jaczewski's statement that the annual loss of agricultural produce in recent years in Russia due to various plant diseases may be conservatively estimated at 30 per cent. of the total yield.

DOUNINE (M. S.) & SIMSKY (A. M.). **Die Haftfähigkeit der Fungicide.** [The adhesive capacity of fungicides.]—*Angew. Bot.*, xiv, 2, pp. 89–110, 1932.

In continuation of their previous studies [*R.A.M.*, xi, p. 441] a series of experiments [the results of which are fully discussed and tabulated] was carried out to determine the influence of various factors on the qualitative and quantitative character of the adhesion of calcium arsenate, potassium bichromate, copper carbonate, and other dusts to the seed of wheat, oats, hemp [*Cannabis sativa*], flax, broomcorn [*Panicum miliaceum*], and *Hibiscus cannabinus*.

The dusts adhered better to heavy seeds, e.g., those of wheat and *H. cannabinus*, than to light ones. No loss of adhesive capacity of the dusts followed the storage of treated wheat and oats for periods up to 3½ months. Some 6 per cent. of the adhering

dust was lost when the treated seed was passed through the Elworti sowing apparatus.

The dusts were found to be unevenly distributed over the seed, the bulk of the material collecting between the hairs ('seed corolla' of wheat) and glumes and in the depressions on the surface. Both mechanical adhesion and molecular forces are considered to govern the process of adhesion of the fungicidal particles to the seed.

RAPHAEL (T. D.). **Spray spreaders.**—*Tasmanian Journ. of Agric.*, N.S., iii, 1, pp. 1–4, 2 figs., 1932.

After noting in what ways the addition of spreaders increases the efficacy of different spraying mixtures, the author gives brief, popular notes on the composition and rate of application of the chief spreading agents in general use, including soap, flour paste, calcium caseinate, prepared white oils, glue, skimmed milk, and linseed oil, the particular sprays that are or are not suitable for use with each being indicated.

SCHNEIDERHAN (F. J.). **Instant Bordeaux.**—*West Virginia Agric. Exper. Stat. Circ.* 60, 8 pp., 4 figs., 1932.

Full directions are given for the preparation of 'instant' Bordeaux mixture [*R.A.M.*, viii, p. 391], in which copper sulphate crystals are replaced by powdered copper sulphate, known commercially as 'snow', and quicklime by superfine chemical hydrated lime, also termed high calcium hydrate. Pulverized copper sulphate is approximately equal in fineness to fine granulated sugar and may be dissolved in cold water in 1½ minutes, while superfine chemical hydrated lime is so fine that 99·5 per cent. will pass through a 325-mesh sieve, its approximate volume being 70 cu. in. per lb. The better grades of this lime contain 70 to 73 per cent. calcium oxide, of which 69 to 70 per cent. is available. The mixture may either be used in a spray tank or traction spray outfit. In addition to various other advantages, including rapidity of preparation and convenience of storage for indefinite periods, instant Bordeaux is actually cheaper than ordinary mixtures owing to the reduction in the amount of labour required and the elimination of special mixture tanks, though the price of chemical hydrated lime is a little higher than that of quicklime ($9 per ton compared with $8). Very satisfactory control of apple blotch (*Phyllosticta solitaria*) on Northwestern Greenings has been given by instant Bordeaux in three years' experiments.

WOODMAN (R. M.). **The evaluation of sulphur suspensions used in spraying.**—*Journ. Soc. Chem. Ind.*, li, 14, pp. 103T–107T, 1932.

An examination was made of the methods of analysis of fungicidal sulphur suspensions [*R.A.M.*, xi, p. 194], special attention being paid to determination of total solids, total sulphur, non-combined sulphur, and protective colloids. The suspensions used were an American (? 'atomic') suspension, two samples of ialine, and four samples of sulsol [loc. cit.].

The determination of total solids was made by various methods, of which the most direct and accurate (given new or non-sedimented

samples) was to place portions of each liquid, after thorough shaking, in tarred bottles and evaporate to dryness at 100° C. Using this method, the average total solids in ialine X amounted to 53·56 weight per cent. (gm. total solids per 100 gm. suspension), the corresponding figures for ialine Y and sulsol D being 53·68 and 57·30, respectively. The guaranteed amounts for the two preparations were 53·5 and 57·80, respectively. The specific gravity of sulsol D was found to be 1·37 (guaranteed 1·388). Three other methods are also described with the results obtained in each case.

The total sulphur was determined by H. G. Pike with the following results: American suspension: average total sulphur in dried residue 91·10 per cent., in suspension 64·31 per cent.; sulsol A: average in dried residue 65·92 per cent., in suspension 28·65 per cent.; sulsol B: average in dried residue 60·90 per cent., in suspension 28·23 per cent.; sulsol C: average in dried residue 74·61 per cent., in suspension 63·87 per cent.; sulsol D: average in dried residue, 74·70 per cent., in suspension 42·81 per cent.; ialine X: average in dried residue 93·91 per cent., in suspension 50·29 per cent.; ialine Y: average in dried residue 94·91 per cent., in suspension 50·94 per cent.

The amount of free sulphur in ialine X was found to be 51·72 per cent. (guaranteed 51·5), the average quantity in the dried residue being 96·59 per cent. In ialine Y the free sulphur amounted to 51·82 per cent. (guaranteed 51·5), the quantity in the dried residue being 96·54 per cent., while the corresponding figures for the American suspension were 64·65 and 91·56 per cent., respectively. The total solids of a 17·78 per cent. suspension of sulsol contained 58·65 per cent. of free sulphur, i.e., the original sample contained 27·19 per cent.; in a 12·11 per cent. suspension of sulsol C the total solids contained 68·1 per cent. free sulphur and the original 58·29 per cent.

The following amounts of non-combined sulphur were found in freshly diluted suspensions: American 0·948 per cent., sulsol D 0·427 per cent., and ialine Y 0·498 per cent. Thiosulphate sulphur was present only in the last-named to the extent of 0·001 per cent. Ialine and sulsol proved superior to the American suspension from the non-sedimentation standpoint, although it should be noted that in the latter case the sedimentation suspension had to be made from a two-months old suspension containing 4 per cent. of solids. It would appear from a comparison of these figures with those obtained in the 1930 samples that the increase of sulphur content in sulsol has been secured at the expense of a relative decrease in stability [ibid., x, p. 195], notwithstanding the greater absolute amount of sulphur retained in suspension and the augmented concentration of protective colloid, whereas in the case of ialine the 1931 sample is superior to that of the previous year in this respect.

Hopkins (S. J.) & Chibnall (A. C.). **Growth of Aspergillus versicolor on higher paraffins.**—*Biochem. Journ.*, xxvi, 1, pp. 133–142, 1932.

In connexion with studies on the metabolism of paraffins in the

plant, a strain of *Aspergillus versicolor* [*R.A.M.*, ix, p. 316] has been found to grow on synthetic higher paraffins as the sole source of carbon. The mould will grow on both odd- and even-number paraffins, but not on those with a longer chain than $C_{34}H_{70}$.

DORAN (W. L.). **Acetic acid and pyroligneous acid in comparison with formaldehyde as soil disinfectants.**—*Journ. Agric. Res.*, xliv, 7, pp. 571–578, 1 fig., 1932.

This is a brief account of experiments the results of which showed that 3 in 100 and 4 in 100 pyroligneous acid solutions, at the rate of 2 qt. per sq. foot, are more effective as soil disinfectants than either acetic acid [*R.A.M.*, vii, p. 526; xi, p. 496] or formaldehyde, and safer and cheaper than either. The treatment protected seedlings of beet, cucumber, and lettuce from damping-off and did not injure them even when it was applied to the soil as late as one day before sowing. It also resulted in an increase of the dry weight of the plants.

SCHWARTZ (G.). **Bodendämpfung als Kulturfaktor zur Bodenverbesserung im Gartenbau.** [Soil sterilization as a cultural factor in the improvement of horticultural soils.]—*Zeitschr. für Pflanzenkrankh. (Pflanzenpath.) u. Pflanzenschutz*, xlii, 5, pp. 193–232, 2 figs., 1 graph, 1932.

The theoretical, practical, technical, and economic aspects of soil sterilization by heat are discussed [*R.A.M.*, xi, p. 471], with directions for the application of the process (*a*) to flat surfaces, e.g., greenhouse soils, frames, seed-beds, and the like, and (*b*) to heaps of compost, etc. The various types of apparatus are described, with observations on the distribution of heat through the soil and the effects of sterilization. Some figures are given showing the costs of soil sterilization as compared with other methods of treatment, the calculations being made on the basis of financial conditions in Germany in September, 1931. A concluding note deals with the heating of the soil by electricity [see next abstract].

CARNEY (L. B.). **Electric soil sterilization.**—*Agric. Engin.*, xiii, 4, pp. 95–96, 1 fig., 1932.

In order to meet the requirements of market-gardeners with small businesses in the rural districts of New York, an electrically heated oven has been developed to sterilize greenhouse soil and destroy such common fungous parasites as *Septoria lycopersici* on tomato and *Rhizoctonia* and *Sclerotinia* spp. on lettuce [cf. *R.A.M.*, vii, p. 335]. A one-cubic-yard box of $\frac{1}{8}$ inch boiler plate, mounted 2 ft. from the floor on angle-iron legs, is furnished with heat by means of nichrome wire in a galvanized iron pipe running parallel through the box and spaced in such a way as to secure the best distribution of heat, insulation between the wire and pipe being effected by porcelain tubes. The brass bolts at each end of the tubes are insulated from the pipe on the outside by a fibre washer. The electrical connexions on the sides are wrapped with asbestos ribbon, and the sides and top are covered with a balsam wool blanket to reduce

radiation losses. Under normal operating conditions the sterilizer is run for 5½ to 6 hours and uses 30 to 35 kilowatt hours.

BLANC (A.). **Les machines nouvelles au XI^e^ Salon de la Machine Agricole.** [New machines at the XIth Exhibition of Agricultural Machinery.]—*Prog. Agric. et Vitic.*, xcvii, 12, pp. 287–292, 5 figs., 1932.

Among the agricultural machinery briefly described in this paper mention may be made of a motor-driven sprayer [cf. *R.A.M.*, xi, p. 247] exhibited by the Société des Anciens Établissements Brouhot of Vierzon (Cher). The new feature embodied in this apparatus is that the spraying liquid is drawn by vacuum suction, created by an independent pneumatic pump, into an air compression chamber, from which it is distributed under pressure to a number of spraying nozzles. By this means the spraying liquids, some of which are highly destructive to delicate mechanical parts, never come into contact with the pump. Constancy of pressure inside the air chamber is ensured by a specially devised by-pass [a diagrammatic section of which is given] to replace the usual safety valves, the regulation being automatic. The apparatus is stated to be particularly well adapted for spraying trees, because of the high pressures which may be attained in it.

HEIM (R.). **Rapport sur les maladies physiologiques et bactériologiques des plantes coloniales.** [Report on the physiological and bacterial diseases of colonial plants.]—*Rev. de Bot. Appliquée et d'Agric. Trop.*, xii, 126, pp. 37–44, 1932.

After a very brief general review of the virus and bacterial diseases that attack cultivated plants, with particular reference to overseas crops, the author points out the lack, due to various causes, of serious phytopathological investigation in the French colonies, where many of these diseases are rife and cause considerable losses. To remedy this unsatisfactory state of things he advocates legislation for the creation of a special administrative organization for the study of the diseases of colonial crops.

NAOUMOFF (N. A.). Методы микроскопических исследований в фитопатологии. [Methods of microscopical investigations in phytopathology.]—224 pp., 4 pl., 51 figs., Гос. Издат. С.-хоз. и Колхозно.Кооп. Литературы. [State Publishing Office of Agric. and Collective Farming Co-operative Literature], Leningrad, 1932.

This is an elementary text-book for the beginner in the study of phytopathology, which the author states he was led from his teaching experience to compile in order to fill the lack of similar publications in Russian and the dearth of those in other languages. After a brief discussion of the principles of optics embodied in the microscope, he describes in detail the correct use of the instrument and all its various subsidiary apparatus. A special section is given to the preparation and staining of microscopical slides, including the preparation and application of the more usual differential stains.

PETRI (L.). **Sur une méthode pour effectuer les injections de virus dans les feuilles.** [On a method of making virus injections in leaves.]—*Deuxième Congr. Internat. de Path. Comp., Paris*, II. *Comptes rendus et Communications*, pp. 439–441, 2 diags., 1931. [Received July, 1932.]

Ordinary medical syringes having proved unsuitable for the inoculation of delicate plant organs, the writer has devised a special method for injecting mosaic virus into citrus leaves [*R.A.M.*, xi, p. 173]. Two metal disks are attached to the leaf by means of springs of the forceps type, the upper disk having fixed to it at an oblique angle a fine tube, within which a slender steel needle can be inserted. The leaf is punctured by pressure of the button at the top of the needle, which is then withdrawn and immediately replaced by a sterilized glass capillary tube filled with the expressed infective juice. The latter may safely be left in the leaf for 24 to 36 hours without disturbing its physiological functions, so that the virus is absorbed gradually.

HALL (A. D.). **Virus diseases of plants.**—*Gard. Chron.*, xci, 2364, pp. 293–294, 1932.

In connexion with a brief general survey of the information at present available on the virus diseases of plants, attention is drawn to the conspicuous increase of these diseases of recent years in English gardens, more especially upon monocotyledonous plants. Tulip 'breaking' [*R.A.M.*, xi, p. 183] is a well-known instance of long standing, while more recently freesia and gladiolus have become seriously affected, the symptoms being manifest as darker fleckings on the flowers. The same disturbance has been observed on the lily, iris, and crocus, and even on the sparsely cultivated *Sternbergia*. A virus disease characterized by yellow stripes and mottling on the leaves appears to be making heavy inroads among narcissi, in many varieties of which the bulbs rapidly weaken and die out. Observations made by Beaumont and Hodson at the Seale-Hayne Agricultural College tend to implicate thrips as the vector of this obscure disease, which is becoming a grave danger to narcissus growing and should be promptly combated by roguing.

STOREY (H. H.). **The bearing of insect-vectors on the differentiation and classification of plant viruses.**—*Deuxième Congr. Internat. de Path. Comp.*, Paris, II. *Comptes rendus et Communications*, pp. 471–479, 1931. [French summary on p. 470. Received July, 1932.]

Recent research has shown that the species of insect vector is usually characteristic of a virus. Most workers have abandoned the view that the insect is a mere mechanical carrier, and consider it as infected by the virus equally with the plant. In the present state of knowledge, a virus is better characterized by its insect vector than by its host or the symptoms produced on the latter. Thus, Stahl has shown that the maize leaf stripe of Cuba and Hawaii is transmitted by *Peregrinus maidis* [*R.A.M.*, viii, p. 160], which gave entirely negative results in the transmission of streak in South Africa [ibid., xi, p. 66] and Tanganyika, although the

symptoms of the two diseases are closely similar. Brandes's view (*Proc. Second Conf. Internat. Soc. Sugar Cane Technologists*, p. 104, 1927) that the African streak disease is 'obviously distinct' from the Cuban stripe will probably now find general acceptance on the basis of the difference of vectors.

At Amani the writer has observed two apparently distinct maize diseases, resembling streak [ibid., xi, p. 427] in general characters but not transmissible by *Cicadulina mbila*. He has also found that a second species, *C. zeae*, is able to transmit streak of maize in Tanganyika, and that the disease thus caused may be retransmitted by *C. mbila*. The specificity of the virus to its vector, therefore, is not absolute. There is also considerable evidence to show that strains of a virus may exist and there are also different races of insect vectors, some of which may vary in their ability to transmit a virus.

EULER (H. v.). **Recherches chimiques sur l'action de deux virus des végétaux.** [Chemical studies on the action of two plant viruses.]—*Deuxième Congr. Internat. de Path. Comp.*, Paris, II. *Comptes rendus et Communications*, pp. 459–461, 1931. [Received July, 1932.]

Comparative biochemical studies at Stockholm on tobacco plants suffering from mosaic and *Abutilon striatum* with infectious chlorosis [*R.A.M.*, xi, p. 387] showed a reduction in the chlorophyll, protochlorophyll, and lipochrome concentrations as compared with healthy plants. In dried chlorotic leaves of *A. striatum* the quantity of catalase in 5 mg. is expressed by the reaction constant 60, compared with 250 in normal foliage. The amylase content was found to remain unchanged both in mosaic tobacco and chlorotic *Abutilon* plants.

Experiments in collaboration with W. Hertzsch confirmed E. Baur's observation that infectious chlorosis of *A. striatum* is transmissible only by bud-grafting. All the leaves developing after infection become chlorotic while the older ones remain green. The results of inoculation with tobacco mosaic bear no proportion to the amount of inoculum used, total infection being secured by even very small quantities.

It would appear from these data that the viruses under discussion continue to develop after inoculation into the plant, a fact that precludes their classification as enzymes. They cannot, on the other hand, be termed microbes since they are devoid of cells, and they must therefore be given an intermediate place as 'enzymoids'. The genes and possibly the bacteriophages are also believed to belong to this group, which corresponds more or less to Eriksson's 'mycoplasm' [ibid., x, p. 260].

PHILLIPS (J.). **Root nodules of Podocarpus.**—*Ecology*, xiii, 2, pp. 189–195, 1932.

This is an expanded account of the writer's investigations on the relative importance to the development of *Podocarpus latifolius* and *P. falcatus* in South Africa of *Pseudomonas* [*Bacillus*] *radicicola* and a mycorrhizal fungus, a preliminary note on which has already appeared [*R.A.M.*, xi, p. 258].

JARACH (M.). **Sul meccanismo dell' immunità acquisita attiva nelle piante.** [On the mechanism of active acquired immunity in plants.]—*Phytopath. Zeitschr.*, iv, 3, pp. 315–327, 5 figs., 1932. [German summary.]

In connexion with a discussion of the mechanism of acquired immunity in plants [*R.A.M.*, xi, p. 391], the writer recapitulates his experiments, at the Milan Serotherapeutical Institute, on the artificial immunization of beans [*Phaseolus vulgaris*] against *Botrytis cinerea* [ibid., viii, p. 457; x, p. 612].

JOHNSON (F. H.). **Effects of electromagnetic waves on fungi.**—*Phytopath.*, xxii, 4, pp. 277–300, 3 figs., 1932.

A study of the influence of gamma rays (from radium from which also some beta rays were transmitted), X-rays, Schumann, ultra-violet [*R.A.M.*, x, p. 772], visible light, and infra-red rays and Hertzian waves on over 1,500 cultures of *Collybia dryophila*, *Fusarium batatatis* [ibid., x, p. 506], and *Sclerotium bataticola* [*Macrophomina phaseoli*: ibid., xi, p. 27] showed that the inhibition of growth by radium (which was most complete in the first-named organism exposed through cellophane covers) was probably a beta-ray effect and thus not due to electro-magnetic waves. No variation was observed under the action of X-rays. Schumann rays were the most destructive but affected a smaller proportion of the mycelium than the ultra-violet rays proper. Ultra-violet rays passing through Corning filter 980 A, cutting off wave lengths below λ 2,302, were less effective than those through cellophane, which extended down to about λ 2,000 but exerted a stronger action than the rays traversing vitaglass, transmitting down to λ 2,536. The sole effect of various wave lengths of visible light was an increase of pigment in *F. batatatis* after exposures of a week or more to the full range. Infra-red rays above λ 7,000 and Hertzian waves of 50 and 100 m. did not affect the organisms used in the tests.

DICKSON (H.). **The effects of X-rays, ultraviolet light, and heat in producing saltants in Chaetomium cochliodes and other fungi.**—*Ann. of Botany*, xlvi, 182, pp. 389–405, 2 pl., 1 graph, 1932.

Malt-agar cultures of ten fungi, both in the mycelial and sporing stages, were exposed to the action of X-rays for periods ranging from five minutes to six hours at a distance of 5 to 18 cm., and of these *Mucor genevensis* [*R.A.M.*, iv, p. 758], *Phycomyces blakesleeanus* (*P. nitens*) [ibid., ii, p. 464], and *Chaetomium cochliodes* produced saltants, which did not occur in the non-irradiated controls and were evidently due, therefore, to the action of the rays. Saltants also developed in sporing cultures of the last-named fungus on exposure to ultra-violet rays from a mercury vapour-lamp for 50 minutes at a distance of 26 cm. Most of the saltants resulting from both methods of treatment remained true to type. Little effect was produced on the germinative capacity of the ascospores of *C. cochliodes* by exposure to the X-rays for periods up to six hours. However, a marked action on subsequent spore growth followed exposures up to four hours, the number of

spores developing only a small mycelium increasing in proportion to the time of irradiation. The subjection of the ascospores to temperatures of 45°, 55°, 67°, or 80° C. failed to induce saltation.

HOWARD (F. L.) & CURRIE (MARY E.). **Parasitism of Myxomycete plasmodia on the sporophores of Hymenomycetes.**—*Journ. Arnold Arboretum*, xiii, 2, pp. 270–284, 2 pl., 2 figs., 1932.

Laboratory experiments (conducted to supplement field observations in Canada and the United States) in which about 85 species of the Hymeniales, ranging from fleshy Agarics to woody Polypores, were inoculated with the plasmodia of 33 Myxomycetes gave positive results in a number of cases. The plasmodia of 15 species [which are enumerated] were found to be definitely mycophagous, while many others, as yet unidentified, showed various degrees of parasitism. The plasmodia destroy the sporophores by active digestion and also by leaving the slimy, injured tissues over which they have passed in an ideal condition for further bacterial and fungous infection.

SALAMAN (R. N.). **The analysis and synthesis of some diseases of the mosaic type. The problem of carriers and auto-infection in the Potato.**—*Proc. Roy. Soc. London*, Ser. B., cx, B766, pp. 186–224, 4 pl., 1932.

After briefly summarizing recent developments in the study of virus diseases of the potato, with particular reference to his own and K. M. Smith's work [*R.A.M.*, x, pp. 49, 615; xi, p. 394, *et passim*], the author describes in considerable detail experiments in which he has obtained evidence that, besides Smith's *x* and *y* viruses, there is a third element which he designates the *z* virus, the characters of which, differentiating it from the other two, are given in a table. Varieties suffering from crinkle 'A' [ibid., ix, p. 603], though clinically similar, were found to contain different virus complexes. They might contain both *x* and *y* or they might have *x* without *y*, but in each case with what the writer believes to be the uninoculable (though transmissible by grafting) virus *z*. By itself this *z* virus has a very limited pathogenicity, but in combination with either *x* or *y* it produces the diseases known as crinkle 'A' and para-crinkle [ibid., ix, p. 604], respectively; it was found to be also present in a streak-carrying Di Vernon unit, and probably occurs in many other infected plants. Evidence is adduced indicating that in para-crinkle as this disease occurs in the field (e.g., in King Edwards) the virus corresponding to the common *y* of other potato virus diseases differs somewhat from the latter, and in this paper it is designated virus *y'*, though its separate entity still remains to be proved. When the *y'z* complex of para-crinkle is passed through an intermediate *Datura stramonium* graft with leaves, only the *z* virus passes, causing a mild mosaic on Arran Victory and no symptoms on President.

By appropriate grouping of the three virus elements it has been possible to produce experimentally clinical symptoms of interveinal mosaic (*xy*), crinkle 'A' (*xz*), and para-crinkle (*yz*), in other words, to synthesize virus complexes in the potato. The synthesis

of the type of crinkle 'A' containing *xz* with *y* has not yet been established. The suggestion drawn from this work is that the reaction of a virus complex is not the mere summation of that of its constituents, but indicates that the complex is a linked group; it is further suggested that the stability of the linkage varies with the nature of the viruses concerned, and in particular with the internal environment of the host. There also was evidence that when a further virus element or a complex of such was added to a virus complex already existing in a plant, a condition was brought about in which the plant did not show any reaction, in the first season at least, and behaved as a carrier.

As shown on three occasions in para-crinkle in Arran Victory, a virus complex present in a plant may spontaneously break up at some actively growing point, in which case one or other of its constituents passes alone into a growing bud and there expresses itself by its usual clinical symptoms. Such a spontaneous splitting was definitely observed in one symptomless carrier variety and was suspected in two others, with the result that the apparently healthy plants became obviously diseased; this phenomenon is described as auto-infection.

Cytological studies of diseased plants showed that intracellular inclusions or X-bodies [ibid., xi, p. 532] are present in infections produced by the *x* virus or where this virus is present; they were absent, however, in infections due to the *y* virus alone and, with a doubtful exception, also in those caused by the *z* virus alone.

BURNETT (G.) & JONES (L. K.). **The effect of certain Potato and Tobacco viruses on Tomato plants.**—*Washington Agric. Exper. Stat. Bull.* (*Tech. Paper*) 259, 37 pp., 5 pl., 1 graph. 1931.

A full account is given of experiments conducted at the Washington Agricultural Experiment Station, Pullman, between 1929 and 1931, to ascertain the effect of certain potato and tobacco viruses when inoculated alone or in various combinations into tomato plants [cf. *R.A.M.*, xi, 394] and the intertransmissibility of these viruses.

The veinbanding virus (obtained from an Early Rose potato and apparently similar to one received from E. M. Johnson [ibid., x, p. 409]) plus the virulent latent virus (namely, the virus sometimes secured from apparently healthy potatoes, but capable of causing white rings and lines on tobacco and spot necrosis on tomato) produced spot necrosis of tomato and tobacco and symptoms very similar to rugose mosaic on potato.

The progeny from an Early Rose potato free from the latent virus when inoculated with rugose mosaic produced typical rugose symptoms. When tobacco mosaic was added to rugose mosaic and inoculated into potato plants affected with the veinbanding virus a more severe type of rugose mosaic was produced than when rugose mosaic alone was used as the inoculum. When potato plants already affected with rugose mosaic were inoculated with tobacco mosaic the rugose symptoms remained unaffected.

Early Rose potato plants carrying the veinbanding virus showed a mild type of rugose mosaic when inoculated with inoculum from

potato plants affected with crinkle mosaic, leaf roll, or spindle tuber (all carrying the latent virus).

The virulent latent virus produced a mild mottle with some necrosis on a virus-free Early Rose potato plant. This virus plus the veinbanding virus on virus-free Early Rose potatoes produced rugose mosaic symptoms including stem streak and leaf necrosis.

The virulent latent virus in combination with crinkle mosaic virus carrying a mild latent virus often produced much milder symptoms on potato, tomato, and tobacco than it did when used alone. The latent virus from crinkle mosaic appeared to produce an inhibitory effect on the expression of the virulent latent virus.

The latent or virulent latent virus was present in 48 tubers showing symptoms of crinkle mosaic, leaf roll, spindle tuber, super mild mosaic, mild mosaic, unmottled curly dwarf, rugose mosaic, and witches' broom.

Inoculum from apparently healthy potatoes carrying the latent virus produced symptoms on tomato and tobacco plants similar to those produced by inoculum from potato plants carrying leaf roll, spindle tuber, and crinkle mosaic; rugose mosaic inoculum gave additional symptoms of chlorosis and spot necrosis. When tobacco mosaic was added to inoculum from any of these sources tomato streak and tobacco leaf necrosis were produced.

When used alone or in combination with the virus of tobacco mosaic the latent virus remained active in dried tomato, tobacco, and potato seedling tissue for at least 46 days; it also remained sufficiently active in tomato plant tissue which had been dried 466 days to produce a 20 per cent. infection.

The latent virus appeared to be the only virus transmitted mechanically to tomato or tobacco from apparently healthy, leaf roll, spindle tuber, or crinkle mosaic potatoes; the veinbanding virus was transmitted from potatoes affected with rugose mosaic.

The veinbanding virus commonly remained active for 10 days in dried plant tissue and persisted for 46 days in dried tobacco leaf tissue.

The latent or virulent latent virus is capable of producing a lethal effect on tomato, tobacco, or potato, and this lethal effect is materially intensified when found in combination with tobacco mosaic.

Under field conditions, apparently, tobacco mosaic may be spread by insects and mechanical means; the latent virus is spread only by mechanical means.

BRYAN (H.). **The maintenance of healthy stocks of Potatoes in England.**—*Journ. Agric. Sci.*, xxii, 2, pp. 358–365, 1932.

In the experiments briefly described in this paper a batch of Majestic seed potatoes (an early maincrop variety) obtained from Scotland was divided into three lots, each of which was grown for three consecutive years at Ormskirk, Lancashire, in isolation from each other and from all other potatoes. In the first lot plants showing virus disease symptoms remained unrogued throughout the whole trial; in the second, all such plants were rogued out each season, and the seed tubers necessary for the next year were lifted

when mature; in the third lot, also rogued, the seed tubers were taken 9 or 10 weeks before maturity. The final produce was tested in 1931 for relative productivity and compared with a fresh batch of the same variety from Scotland, in a chequer-board yield trial, with the result that the Scotch seed gave a crop significantly larger than that of any of the three stocks produced locally. No significant difference was seen in the yields from the lines obtained by the second and third method, but both were significantly superior in yield to the unrogued stock. It is pointed out that the third method, i.e., lifting the seed tubers before maturity, apparently maintained the health, but not the cropping power of the stock, and it is believed that the almost complete absence of virus disease symptoms in this stock in 1929 indicates that the reduction in crop is attributable to some other cause, possibly the immaturity of the seed tubers.

From a practical point of view it is considered that the second method, i.e., saving the seed tubers when mature from rogued stud plots, is well worthy of trial by commercial growers who do not wish to renew their stocks from Scotland at too frequent intervals. The work also supplied a good illustration of the depressing effect of the virus diseases on yield.

EICHINGER. **Kartoffelschorf und Düngung.** [Potato scab and manuring.]—*Fortschr. der Landw.*, vii, 7, pp. 193–195, 1932.

The writer has continued his observations and investigations in Saxony on the effects of different fertilizers on the incidence of potato scab [*Actinomyces scabies*: *R.A.M.*, x, p. 402]. The disease was present on a plot that had received no synthetic fertilizers for ten years, so that infection could not be attributed to this source. A plot receiving ammonium sulphate only was practically free from scab both in 1930 and 1931, but the beneficial effect of this compound was found to be neutralized by an admixture of basic slag and potassium chloride. Where superphosphate was substituted for basic slag and potassium magnesium sulphate for potassium chloride, the incidence of scab was reduced. A marked increase of infection followed the replacement of ammonium sulphate by sodium nitrate.

KAHSNITZ & KLEINE. **Vorbeugende Massnahmen zur Bekämpfung des Kartoffelkrebses.** [Preventive measures in the campaign against Potato wart.]—*Mitt. Deutsch. Landw.-Gesellsch.*, xlvii, 14, pp. 248–249, 1932.

Of the 40,000,000 (on an average) doppelzentner of potatoes annually harvested in Pomerania, where the area under this crop covers 15·1 per cent. of the total cultivated land, 750,000 to 1,000,000 dz. is certified seed. Hitherto there has been no case of wart disease [*Synchytrium endobioticum*] in any of the seed potato farms, but isolated centres of infection have been found in allotments and the like, and in order to protect the valuable Pomeranian seed potato trade police orders have been issued prohibiting the cultivation, in farms and gardens up to 5 hect. in extent, of any varieties other than those officially recognized as wart-immune [*R.A.M.*, x, p. 684]. Exceptions to this rule may be made, at the

discretion of the competent authorities, up to 1st July, 1933. All seed potatoes used for planting in the above-mentioned small holdings must be officially passed for this purpose by the German Agricultural Society or the Chamber of Agriculture.

SALAMAN (R. N.). **Recent progress in the breeding of Potato varieties resistant to blight (Phytophthora infestans).**—*Deuxième Congr. Internat. de Path. Comp.*, Paris, II. *Comptes rendus et Communications*, pp. 436–437, 1931. [French translation on p. 435. Received July, 1932.]

A rapid and fairly reliable method, similar to that used by Müller in Germany [*R.A.M.*, x, p. 545], has been developed at Cambridge for tests on varietal resistance to late blight (*Phytophthora infestans*) in the potato. Seedlings are grown in closed glass cases under controlled conditions of temperature and humidity and sprayed almost daily with conidial suspensions of the fungus. The most susceptible are killed in five or six days, the more resistant survive for two or three weeks, and the immune individuals do not become infected. From hybrids between the virtually immune wild species, *Solanum utile*, and cultivated varieties a few highly resistant seedlings have been obtained, while during the last three years a few seedlings (only about 1 in 300 of certain families) of purely domestic parentage have also given promising results. The South American species, *S. antiporichi*, Aya papa, and Papa amarilla, and selfed seedlings of *S. utile* and *S. antiporichi* have proved immune, but the bulk of the F_1 progeny in the resistant × domestic crosses are susceptible, resistance to late blight evidently being a recessive genetic character.

BONDE (R.). **A promising blight resistant Potato.**—*Amer. Potato Journ.*, ix, 14, pp. 49–54, 1932.

Notes are given on the 'Foster's Rust Proof' potato variety which has proved extremely resistant to late blight (*Phytophthora infestans*) in Aroostook County, Maine, under conditions highly favourable to the development of infection. Surveys were made in 1930 and 1931 to determine the extent of the losses caused by late blight in the district under observation during seasons of serious epidemics [cf. *R.A.M.*, vi, p. 314]. On the experimental farm, badly blighted, unsprayed plots yielded about 100 bushels less per acre in both years (18 to 25 per cent. loss) than the treated plots. The value of a satisfactory resistant variety is therefore obvious. The Rust Proof potato (which is believed to have originated in New Brunswick, Canada, as a composite cross between Irish Cobbler, Green Mountain, Carman, and Beauty of Hebron) has smooth, white tubers and a tough, firm skin, which are desirable characters for breeding purposes.

MANNS (T. F.). **Chemical disinfection of Sweet Potato seed beds.**—*Trans. Peninsula Hort. Soc., 1931*, Delaware, xxi, 5, pp. 81–84, 1932.

Preliminary experiments with some twenty chemical treatments indicated that tuber diseases of sweet potatoes may be effectively controlled by watering the soil of old beds, when planting the

potatoes, with a 1 in 10,000 solution of mercuric chloride at the rate of 200 galls. per 500 sq. ft., a treatment which was shown to keep down the detrimental organisms for a period of two weeks. Other chemicals also gave promising results, and further work is in progress to establish the economic feasibility of the treatments.

PARK (M.) & BERTUS (L. S.). **Sclerotial diseases of Rice in Ceylon. 1. Rhizoctonia solani Kühn.**—*Ann. Roy. Bot. Gard., Peradeniya*, xi, 4, pp. 319–331, 1 pl., 1932.

In this, the first of a series of papers on the sclerotial diseases of rice in Ceylon, the authors give an account of their observations and experiments on a strain of *Corticium solani* found in association with a basal rot of the crop [*R.A.M.*, vii, p. 224]. The morphology and behaviour of the organism in culture were similar to those described in a previous paper [ibid., vii, p. 744], but a full discussion of these characters is reserved for the final issue of this series. Inoculation tests [considerable details of which are given] indicated that the fungus is capable of infecting and killing young rice seedlings under humid conditions, but its activity was in a large measure inhibited under conditions of medium and low humidity. Experiments with older plants, together with field observations, suggested that while the parasite is able to cause local infection of such plants under normal conditions, most of the mature plants recover. In no case was the fungus seen to penetrate the living roots either of seedlings or of mature rice plants.

Experiments to test the viability of the sclerotia of *C. solani* showed that these bodies retained their germinability after six years' storage in a corked tube in the laboratory, 130 days' exposure on air-dry rice soil or burial at a depth of ½ inch in such soil, and 224 days' immersion in tap water. The sclerotia began to lose their viability after exposure to direct sunlight for 183 hours during a period of 34 days, and were killed by 204 hours' exposure, the sun temperature during that period varying from 35° to 69·5° C., with a mean of 56·6°. The bearing of these data on the possible control of the fungus in the field is briefly discussed, with the inference that it can be checked only by direct treatment of infected soil, e.g., heating by incineration on it of the diseased crop and other vegetable refuse.

PARK (M.) & BERTUS (L. S.). **Sclerotial diseases of Rice in Ceylon. 2. Sclerotium oryzae Catt.**—*Ann. Roy. Bot. Gard., Peradeniya*, xi, 4, pp. 342–359, 2 pl., 1 graph, 1932.

Continuing their studies of sclerotial diseases of rice in Ceylon [see preceding abstract], the authors describe field observations and controlled experiments on *Sclerotium oryzae* [*R.A.M.*, vii, p. 224; xi, pp. 432, 469], the symptoms of which on young rice seedlings are a yellow and later brown discoloration of the leaves; lesions on the shoots, especially at water level; and the presence of sclerotia on and in the lower parts of diseased leaves, shoots, and in the roots. In plants approaching maturity in the field the disease is rendered conspicuous by the unusual production of tillers from the base of the stem or sometimes from nodes above

the soil; the affected stalks turn yellow and die and sclerotia occur in the base of the stem but not in the roots. The yield of infected stalks is usually nil, or a few light grains may be produced. Measurements of sclerotia formed in maize meal agar showed these bodies to range in size from 175 to 580 μ, the mean diameter being 374·5 $\pm$ 4·3 μ with a standard deviation of 92 μ. On comparison the Ceylon fungus was found to be identical in morphological and cultural characters with cultures obtained from the Centraalbureau voor Schimmelcultures, Baarn.

Laboratory inoculation experiments [details of which are given] indicated that under normal conditions for plant growth the parasitism of *S. oryzae* on rice is not very marked, while under abnormal conditions the seedlings became infected in every case. Root infection of the seedling occurred only after the aerial portions were infected, and then not always, and infection of the latter was more extensive in plants shaded from direct sunlight, indicating that atmospheric humidity is an important factor in the etiology of the disease. Mortality was higher when young plants were inoculated, but the resultant damage to the crop was greater when older plants were infected. Varieties of rice imported from Burma were much more severely attacked than a local variety grown under similar conditions. There was also some evidence of individual resistance to the disease.

Further tests showed that the sclerotia of *S. oryzae* remain viable on air-dried rice soil in the shade for 6½ months, when buried in moist soil in the shade for 4½ months, when submerged in water (in the presence of a green alga) for 10½ months, and under dry conditions *in vitro* for 17½ months; they were killed by one month's exposure to direct sunlight. These laboratory results are considered to indicate that none of the natural conditions prevailing in Ceylon can be utilized for the control of the disease, the only effective check to which is the incineration *in situ* of the infected rice plants [cf. ibid., x, p. 586], and measures directed towards the prevention of mechanical distribution of the sclerotia.

DOPHEIDE (A. B. A.). **Abnormale bladafval in volwassen Heveatuinen, als gevolg van aantasting door Phytophthora faberi.** [Abnormal leaf fall in mature *Hevea* gardens in consequence of infection by *Phytophthora faberi*.]—*De Bergcultures*, vi, 18, pp. 445–446, 2 figs., 1932.

During the abnormally rainy period from December, 1931, to March, 1932, the causal organism of stripe canker on *Hevea* rubber (*Phytophthora faberi*) [*P. palmivora*] was responsible for severe defoliation in the Proempang plantation, Java [*R.A.M.*, ix, p. 267]. The leaves fell from the full-grown trees with their petioles attached, the heaviest damage occurring in gardens shaded from the morning sun; in one such area 65 per cent. of the trees showed some defoliation, especially of the lower branches, 13 per cent. were practically denuded of all their leaves, while only 22 per cent. were unaffected. Spraying with Bordeaux mixture is impracticable in the region under observation, both on account of expense and by reason of topographical difficulties.

PARK (M.). **Fungus diseases and green manuring.**—*Trop. Agriculturist*, lxxviii, 2, pp. 67–82, 1932.

In this paper the author discusses [with numerous references to the relevant literature] the relation between the diseases [which are listed] of cover crops and green manures such as *Tephrosia candida*, *Vigna oligosperma*, *Centrosema pubescens*, *Crotalaria* spp., *Erythrina lithosperma*, *Leucaena glauca*, and the like, in Ceylon and those of the economic crops among which the former hosts are grown. Most of the diseases dealt with have already been noticed from other sources [*R.A.M.*, iii, p. 3; vi, pp. 582, 684; vii, pp. 68, 744; viii, pp. 202, 333, 524, 608].

s'JACOB (J. C.). **Rhizoctonia-aantasting bij Lamtoro.** [*Rhizoctonia* infection of Lamtoro.]—*De Bergcultures*, vi, 14, pp. 349–350, 1 fig., 1932.

In an experimental garden of the Besoeki Station, Java, lamtoro [*Leucaena glauca*] plants recently sustained extensive damage from the attacks of a species of *Rhizoctonia* which seemed to have spread from a plot of *Centrosema* [*pubescens*]. However, a comparative study of pure cultures of the lamtoro fungus with those obtained from *C. pubescens* showed that the former produced no sclerotia either on banana or oatmeal agar, while the latter formed brown sclerotia about 1 mm. in diameter. Cross-inoculation tests showed that the species from *C. pubescens* is unable to infect *L. glauca* and vice versa, so that the two forms are obviously physiologically distinct, though no differences were perceptible between the mycelia. Gandrup's species on *C. pubescens* [*R.A.M.*, iv, p. 565], which he named *R. solani*, was probably not identical with that observed on the same host by the writer, since the former is reported to have formed no sclerotia in pure culture. In view of the prevailing confusion regarding the taxonomy of *Rhizoctonia*, it is proposed to adopt K. S. Thomas's system of classification [ibid., ix, p. 443], grouping both forms under *R.* [*Corticium*] *solani* but adding the name of the host in each case, viz., *R. solani centrosemae* and *R. solani leucaenae*.

During a spell of exceptionally wet weather in February, the disease spread very rapidly over an area of some 10 bouw [7·1 hect.]. Among older plants the damage was confined to the leaves and young shoots, while the seedlings collapsed entirely. Good control has been obtained by six applications of Bordeaux mixture at three- to four-day intervals, but this practice would scarcely be practicable on a large scale on account of its high cost.

Shortly before this paper was sent to press, a report was received of the occurrence of a similar disease of *L. glauca* in Central Java, presumably due to *Rhizoctonia*.

JENSEN (H. L.). **Contributions to our knowledge of the Actinomycetales. II. The definition and subdivision of the genus Actinomyces, with a preliminary account of Australian soil Actinomycetes.**—*Proc. Linn. Soc. New South Wales*, lvi, 4, pp. 345–370, 2 pl., 1931.

In this paper the author gives a morphological and cultural account of some 23 species (four of which are new) of Actinomy-

cetes isolated from various Australian soils, with the purpose of obtaining a more reliable basis for the study of this group of organisms. The strains investigated fell into two main groups, the first of which (*Actinomyces, sensu strictu*) produced an aerial mycelium differentiating into spore-like bodies; and the second, for which the new generic name *Proactinomyces* is proposed, gave an aerial mycelium (sometimes nearly or wholly absent) without any differentiation into spores other than the breaking up of the hyphae into bacterium-like segments.

JONES (W.). **Downy mildew infection of Hop and Nettle seedlings in British Columbia.**—*Journ. Inst. of Brewing*, N.S., xxix, 4, pp. 194–196, 2 figs., 1932.

Seed of the common nettle of British Columbia, *Urtica lyalli*, was sown in moist chambers in the laboratory at Saanichton and inoculated, on the appearance of the cotyledons and primary leaves, with conidial suspensions of hop downy mildew (*Pseudoperonospora humuli*) [*R.A.M.*, xi, p. 402]. Within six days a few of the seedlings began to wilt, and subsequently oospores of the fungus were found in profusion in the tissues. A few conidiophores bearing conidia were also produced on some of the cotyledons and primary leaves. One of the infected seedlings was transferred to the greenhouse, allowed to grow to a height of about eight inches, replaced in the moist chamber, and again inoculated with conidial suspensions. In ten days or so several of the leaves were found to be slightly infected, showing angular brown areas near and between the veins. Oospores were found on all the diseased areas and conidia on a few of them. *U. lyalli*, therefore, is evidently not entirely immune from infection by *P. humuli*, as reported by Newton and Yarwood [ibid., ix, p. 677; cf. also ibid., x, p. 736]. Should the results of these laboratory tests be corroborated by field observations, the destruction of infected nettle and hop seedlings (which have also been found to contain the oospores of the fungus) in and near the hop gardens will constitute an important measure of control.

HARMAN (H. W.). **The spraying of Hops with Bordeaux mixture.**—*Journ. Inst. of Brewing*, N.S., xxix, 4, p. 197, 1932.

During 1931 the treatment of hops with Bordeaux mixture [against downy mildew, *Pseudoperonospora humuli*] was widely practised for the first time in England and an analysis of the amount of copper detected in the sprayed hops is therefore considered to be of interest. It was found that 60 per cent. contained from 1 to 50 parts per million of copper, 20 per cent. 50 to 100 parts p.m., and 20 per cent. 100 to 400 parts p.m. A hop containing 50 parts p.m. of copper would introduce $\frac{1}{300}$th grain per gallon of copper into the beer, an amount that cannot be regarded as harmful in the slightest degree. Analyses of foreign hops have demonstrated a copper content of up to 900 parts p.m., and possibly a similar quantity may occasionally be found in England, but subject to the precautions in spraying recommended by Prof. Salmon [*R.A.M.*, xi, p. 471], there is clearly no risk that the purity of the beer will suffer or brewing operations be disor-

ganized. Care must be taken, however, that no excess of copper is allowed to reach the yeast.

DODDS (H. H.) & FOWLIE (P.). **Experiments to test the effects of streak disease on Uba Cane.**—*South African Sugar Journ.*, xvi, 4, pp. 231, 233, 1 fig., 1932.

On 26th October, 1927, four plots were planted with streak-diseased Uba cane [*R.A.M.*, xi, p. 540] and four with healthy, three seed pieces, each having one eye, being placed in each hole. Out of 1,728 healthy eyes planted, 1,535 (88·82 per cent.) germinated, the corresponding figure for the diseased being 1,411 (81·65 per cent.). The plants were then thinned out so that only one was left in each hole. In the following July, when the crop was cut, the average yield of the streak plots was found to be 39·75 tons per acre, compared with 44·78 for the healthy, corresponding to an average decrease in the former of 11·24 per cent. On 19th November and 31st December, 1929, counts were made of the number of plants that had contracted secondary infection; the percentages in the four plots on the latter date were 40·97, 68·05, 52·08, and 52·00, respectively. In June, 1931, when the first ratoon crop was cut, the average yield of the streak plots was 32·72 tons per acre, compared with 36·49 for the healthy, corresponding to an average decrease in the former of 10·33 per cent. The average weight of the diseased sticks was 0·95 lb. a stick, as against 1·06 lb. in the healthy ones. On 21st November, 1931, the percentages of infection in the four streak plots were 63·9, 79·9, 70·8, and 67·5, respectively.

FARIS (J. A.). **The utilization of varieties in the field control of Sugar Cane mosaic and root diseases in Cuba. (A preliminary report.)**—*Trop. Plant Res. Foundation, Scient. Contrib.* 20, 69 pp., 1931. [Received July, 1932.]

According to Bruner's first report (*Cuba Estac. Exper. Agron. Circ.* 61, 1925), the reduction in the weight of Cristalina sugar-cane due to the use of mosaic seed cane in Cuba [*R.A.M.*, x, pp. 271, 689] amounted to 62·9 per cent., while in a further account of the same series of tests (*Mem. Gen. Dept. Agric., Comb. y Trab.*, p. 44, 1931) the losses in the successive ratoon crops on the polvillo (fine dust) red type of Matanzas clay are given as 84·11, 81·95, 74·39, and 95·5 per cent., respectively, making an average of 79·5 per cent. for the five crop period. In two series of tests by the writer on Rio Cauto clay soil, the average annual losses from mosaic over a five-year and a three-year period, respectively, were 11 and 8 tons of cane per acre (30·82 and 23·42 per cent. of the yield).

Some general considerations are reviewed, arising out of the data [which are fully tabulated] from varietal reaction tests occupying the greater part of this paper. The replacement seems imminent of the highly susceptible Cristalina by S.C. 12/4 or one of the P.O.J. varieties, of which 2725, 2727, and 2878 are resistant to mosaic [ibid., xi, p. 541] and therefore more suitable for cultivation on certain types of soil where S.C. 12/4 is liable to succumb. The B.H. 10(12) variety is very susceptible to mosaic and its value is therefore limited to areas in which the spread of this disease is

likely to be slow. The sucrose content of P.O.J. 2727 and 2878 is low, particularly in the former, so that these varieties will probably not be permanently adopted in districts where satisfactory results are given by canes with a higher sucrose content. The Co. 281 variety has been found somewhat susceptible to mosaic [ibid., ix, p. 87] and was consequently discarded from further testing.

ORIAN (G.). **Maladies et apparences anormales observées sur la P.O.J. 2878 à Maurice.** [Diseases and abnormal growths observed on P.O.J. 2878 in Mauritius.]—*Rev. Agric. de l'Ile Maurice, 1931*, 60, pp. 230–232, 1931. [Received July, 1932.]

Quoting from a communication received from Java, the author states that the stem galls recently described by him on P.O.J. 2878 sugar-canes and a few other varieties in Mauritius [*R.A.M.*, xi, p. 265] are of fairly frequent occurrence in Java on that and some other recent varieties of P.O.J. canes. Opinion in that country (though so far lacking experimental proof) is that these galls are the result of mechanical injuries to the setts and are not of an infectious nature or of any economic importance. When setts bearing galls are planted, one or two of the more vigorous shoots produce normal canes, while the remainder die off.

In Mauritius the P.O.J. 2878 cuttings occasionally produce a cluster of weak, spindling shoots, due to the early development of the normal buds; in other cases, however, there is an abnormal growth of very numerous shoots arising from adventitious buds that form on callosities on the sett rhizome, the witches' broom appearance being much more marked in the latter than in the former case. In a few cases some of the abnormal shoots died prematurely, and others turned completely white.

Cases of leaf scald (*Bacterium albilineans*) [ibid., ix, p. 491] were observed on P.O.J. 2878 in three localities of Mauritius in 1931, and the number of plants affected is believed to indicate a rather high susceptibility of this cane to scald, taking into consideration the short time that this variety has been in the island.

PETRAK (F.) & CIFERRI (R.). **Fungi dominicani. II.** [Dominican fungi. II.]—*Ann. Mycol.*, xxx, 3–4, pp. 149–353, 1932.

The present important contribution to the knowledge of tropical micro-fungi is stated to be based chiefly on the study of a large collection from the Dominican Republic submitted to the authors by the late Dr. E. L. Ekman [cf. *R.A.M.*, x, p. 756]. A very large number of new species and a good many new genera are included, all of which are furnished with diagnoses in Latin and German. Few of the hosts are of economic importance. The list is enriched with copious morphological and taxonomic notes, not only on the new but also on many of the previously known species.

UNAMUNO (L. M.). **Notas micológicas. II. Adiciones a los Hifales de la flora española.** [Mycological notes. II. Additions to the Hyphales of the Spanish Flora.]—*Bol. Soc. Española Hist. Nat.*, xxxii, 3, pp. 161–169, 2 figs., 1932.

Continuing his critical studies of fungi collected in various parts

of Spain [*R.A.M.*, xi, p. 328], the writer here enumerates 30 species and two varieties of Hyphales belonging to the Tubercullariaceae, Dematiaceae, and Mucedineae.

Cercospora capsici Unam. n. sp. [but see *C. capsici* Heald & Wolf, 1911; *C. capsici* Marchal & Steyaert, 1919: ibid., xi, p. 281] occurring in association with *Oidiopsis sicula* Scal. [loc. cit.] on living leaves of *Capsicum annuum* in Valencia, formed numerous amphigenous, scattered or confluent, circular to ellipsoid, brownish to black, diffuse spots, 5 to 10 mm. in diameter. The fungus is characterized by dark brown stromata, 34 to 39 by 28·5 to 45 μ, from which arise fasciculate, straight or slightly curved, continuous, simple, yellowish-brown conidiophores, 31·2 to 37·5 by 4·5 to 5·5 μ, producing polymorphous, cylindrical, fusoid, uni- to tri-septate, acrogenous, yellowish-brown conidia, 34·2 to 77·1 by 3·5 to 5·5 μ at the broad basal part, tapering towards the apex or more rarely undulating. *O. sicula* is a new record for Spain and is stated not to have been previously reported on *C. annuum*.

SĂVULESCU (T.) & RAYSS (T.). **Nouvelle contribution à la connaissance des Péronosporacées de Roumanie.** [New contribution to the knowledge of the Peronosporaceae of Rumania.] —*Ann. Mycol.*, xxx, 3–4, pp. 354–385, 14 figs., 13 graphs, 1932.

Taxonomic and geographical notes are given on 42 species of Peronosporaceae collected by the authors in Rumania since the publication of their previous study on the same subject [*R.A.M.*, x, p. 130]. The list comprises several new species which are furnished with Latin diagnoses and frequency curves of their conidial dimensions, but in general the hosts are of little economic importance.

SPARROW (F. K.). **Observations on the parasitic ability of certain species of Pythium.**—*Phytopath.*, xxii, 4, pp. 385–390, 1932.

Details are given of the methods and results of the writer's experiments on the pathogenicity of *Pythium dictyosporum*, *P. angustatum*, and *P. adhaerens*, the last-named isolated from the green alga *Rhizoclonium hieroglyphicum* and the others from *Spirogyra crassa* [*R.A.M.*, x, p. 625] to various algae and phanerogamic plants. *P. adhaerens* was found to be the most virulent parasite on the algae.

Both *P. adhaerens* and *P. dictyosporum* infected all the Granite State, White Wonder, and White Spine cucumbers into which they were inoculated, the rot produced being of the 'leak' type [cf. ibid., vii, p. 2]. *P. adhaerens* also infected green and ripe tomato and Yellow Summer Crookneck squash fruit, and produced a root rot of Mammoth White Cory maize and Breck's Old Glory pea seedlings. Seedlings of the maize variety in question were also attacked by *P. angustatum*. *P. adhaerens* was the only one of the three species found capable of infecting sugar beet seedlings (Klein's Wanzleben), 85 per cent. of which developed symptoms of damping-off.

NANNFELDT (J. A.). **Studien über die Morphologie und Systematik der nicht-lichenisierten inoperculaten Discomyceten.** [Studies on the morphology and systematics of the non-lichenized, inoperculate Discomycetes.]—*Nova Acta Reg. Soc. Scient. Upsaliensis*, Ser. iv, viii, 2, 368 pp., 20 pl., 45 figs., 2 diags., 1932.

This monograph covers a much wider range than its title suggests, for the first 56 pages comprise a masterly discussion of the systematics of the Ascomycetes. *Spermophthora gossypii* [*R.A.M.*, viii, p. 201; x, p. 120], the most primitive of all the known Ascomycetes, is characterized by an antithetic alternation between a haploid and a diploid generation. The former terminates with the formation of gametangia, the gametes of which fuse and give rise to a diploid generation culminating in the production of typical asci.

The higher Ascomycetes are divided into three main groups in an ascending scale, viz., Plectascales, Ascoloculares, and Ascohymeniales, the first comprising the Gymnoascaceae, Aspergillaceae, Cephalothecaceae, Ophiostomataceae, and Chaetomiaceae; the second, the Perisporiales, Myriangiales, Hemisphaeriales, and Pseudosphaeriales (Dothioraceae, Pleosporaceae, and Mycosphaerellaceae); and the third, the majority of the Discomycetes and the true Pyrenomycetes, namely, Pezizales, Ostropales, Helotiales, Lecanorales, Sphaeriales, Diaporthales, Valsales, Coronophorales, and Clavicipitales.

DAVIDSON (R. W.). **Notes on tropical rusts with descriptions of two species.**—*Mycologia*, xxiv, 2, pp. 221–228, 2 figs., 1932.

In this paper the author gives notes on 14 species of rusts from Central America, two of which are considered to be new to science, and Latin diagnoses of which are appended. Among them mention may be made of *Spirechina pittieriana* (P. Henn.) Arth. (characterized by large spiny uredospores) on *Rubus* sp. and *Puccinia paulensis* on *Capsicum annuum* in Guatemala, both being new records from that country. The aecidia and teleutosori of *P. paulensis* cover large areas of the stems, leaves, and flowers of the host, and distort the affected parts; in Guatemala no pycnidia or uredosori of the rust were found, and the teleutospores were often formed in the old aecidia. It is pointed out that Kern and Whetzel have recently described the aecidial stage of what they believed to be a new rust on *Capsicum* in Colombia (*Journ. Dept. Agric. of Porto Rico*, xiv, pp. 301–348, 1930), their description fitting very well with the same stage of the Guatemalan fungus. This and other data in the literature [a brief review of which is given] would make it probable that *P. paulensis* is more widely distributed than previous records indicate.

GHIMPU (V.). **Bolile cu virus ale Tutunului.** [Virus diseases of Tobacco.]—Reprinted from *Bul. Cultivărei și Fermentărei Tutunului*, Bucarest, xxi, 2, 54 pp., 11 pl., 1932. [French summary.]

From his field observations and controlled experiments in Bucarest the author gives a detailed description of four virus

diseases of tobacco which he found occurring in Rumania, namely, mottled mosaic, ring spot, veinbanding, and spot necrosis. He distinguishes four forms of ring spot, in which no transitional characters from one to the other could be seen. As far as he is aware, this disease had not been previously recorded from Rumania. The remainder of the paper is occupied by a discussion of the relevant literature [a bibliography of which is appended, covering some 120 titles], and an account of the author's inoculation experiments and cytological study of diseased tobacco plants.

PITTMAN (H. A.). **Downy mildew (so-called 'blue mould') of Tobacco. Found occurring naturally on wild Tobacco (Nicotiana suaveolens) in the Wheat belt. Precautions necessary during the forthcoming season.**—*Journ. Dept. Agric. Western Australia*, 2nd Ser., ix, 1, pp. 97–103, 3 figs., 1932.

Continuing his studies of the tobacco downy mildew (*Peronospora* sp.) problem in Western Australia [*R.A.M.*, xi, pp. 8, 408], in this paper the author reports the discovery in 1931 of the widespread occurrence of the disease on wild tobacco (*Nicotiana suaveolens*) in several localities of the Western Australia wheat belt far removed from fields of cultivated tobacco. This discovery tends to confirm the already existing suspicion that the fungus is indigenous in Australia, and to explain the severity of its outbreaks from the very inception of the tobacco-growing industry there. It also indicates the inadvisability of the practice of some tobacco growers of having their seedlings grown in the wheat belt. The paper terminates with a discussion of control measures, among which the necessity is stressed of a strict removal of all tobacco plants after harvest, whether cultivated or volunteer, to prevent the overwintering of the fungus in the fields.

Amtliche Pflanzenschutzbestimmungen. [Official plant protection regulations.]—*Beil. Nachrichtenbl. Deutsch. Pflanzenschutzdienst*, iv, 2, pp. 48, 61–66, 1932.

GERMANY. As from 2nd February, 1932, the importation into Germany of rooted plants of the genus *Ulmus* and the Canadian poplar (*Populus canadensis*), as well as of cuttings, slips, graft shoots, and other fresh shoots of these plants is prohibited until further notice [presumably with a view to the exclusion of *Graphium ulmi* on elms, and canker and *Dothichiza populea* on poplars: *R.A.M.*, x, p. 567; xi, pp. 274, 338]. Permission for the import of woody plants other than those named will be granted only on the production of a duly authenticated certificate vouching for the freedom of the consignment from any admixture of elm or poplar plants or parts thereof.

GREECE. An Order of 22nd August, 1929, prohibits the importation into Greece from foreign countries (whether infested by *Phylloxera* or not) of vine stocks of every kind and of all parts thereof either in the fresh or dry state (other than mash, must, and wine); of organic or plant manures or mixtures thereof; of soil, humus, and any kind of ship's ballast consisting of soil, gravel mixed with soil, or sand; and of all manner of plants in the fresh

state and of fresh cuttings, shoots, roots, tubers, stalks, bulbs, rind, branches, leaves, flowers, and fruits of garden plants, e.g., tomatoes, cucurbits, eggplants, and vegetables in general. Cuttings without roots and seeds may be imported subject to a permit from the Ministry of Agriculture, and fresh orchard fruits are admitted without restriction.

Advies aan importeurs van planten, stekken, bollen, knollen, vruchten en zaden. [Notice to importers of plants, cuttings, bulbs, tubers, fruits, and seeds.]—*De Bergcultures*, vi, 15, pp. 386–389, 1932.

The following are among the regulations governing the importation of plant material into the Dutch East Indies, issued 15th November, 1929, revised 15th May, 1931. All consignments of living plant material (including fruits and seeds) with certain exceptions [which are listed] from foreign countries (including Holland) must be accompanied by a duly authenticated certificate guaranteeing the freedom of the goods from diseases and pests. Potato consignments from certain [named] countries must further be accompanied by a certificate stating that the material is free from wart disease (*Synchytrium endobioticum*), and that the causal organism is not known to occur within a radius of at least 500 m. from the place of cultivation. The importation of *Hevea* rubber plants or parts thereof (including seeds) from South America is strictly and entirely prohibited, and is permitted from other countries only on production of a certificate guaranteeing the freedom of the material from South American leaf disease (*Passalora heveae* or *Fusicladium macrosporum*) [*Dothidella ulei*: *R.A.M.*, v, p. 689] and *Phytophthora* leaf fall [ibid., ix, p. 405], and vouching for the fact that the plantations in which the plants originated were not supplied with material from countries infested by these diseases.

Gesetze und Verordnungen. [Laws and regulations.]—*Nachrichtenbl. Deutsch. Pflanzenschutzdienst*, xii, 4, pp. 30–32, 1932.

GUATEMALA. As from 24th September, 1931, consignments of living plants entering Guatemala must be accompanied by properly authenticated certificates stating, in addition to other particulars, that the nurseries and seed selection establishments in which the plants originate are absolutely free from plant diseases of any kind.

TURKEY. By an Order of the Turkish Government dated 9th December, 1931, the following agricultural produce may be imported into Turkey during the first quarter of 1932 without restriction other than an official permit: sugar beet, potato, wheat, and other seed, tree and vine cuttings, vegetable and flower seed of all kinds, young plants and bulbs. On 20 February, 1932, this list was supplemented, on the basis of an Order regulating imports for the second quarter, by freshly rooted flower cuttings and grafts.